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

DTE Energy

Detroit Edison

10 CFR 51.45
10 CFR 52.77
10 CFR 52.79

September 2, 2010
NRC3-10-0036

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 Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 39 Related to the SRP Sections 2.0, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 13.3, 13.6.1 and 17.5 for the Fermi 3 Combined License Application," dated July 20, 2010

Subject: Detroit Edison Company Response to NRC Request for Additional Information Letter No. 39

In Reference 2, the NRC requested additional information (RAI) to support the review of certain portions of the Fermi 3 Combined License Application (COLA). The responses to these RAIs are provided in Attachments 1 through 16 of this letter. Information contained in these responses will be incorporated into a future COLA submission as described in the RAI response.

Responses to RAIs 02.03.02-7 and 02.03.04-5 include CDs containing electronic files as requested by the NRC Staff. The file format and names on the enclosed CDs do not comply with the requirements for electronic submission in the NRC Guidance Document, "Guidance for Electronic Submissions to the NRC," dated May 17, 2010; the files are not "pdf" formatted. The NRC Staff requested the files be submitted in their native formats required by the software in which they are utilized to support NRC review of the COLA.

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NRO

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 2nd day of September 2010.

Sincerely,

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

Attachments:
1) Response to RAI Letter No. 39 (Question No. 13.03-54)
2) Response to RAI Letter No. 39 (Question No. 02.03.01-15)
3) Response to RAI Letter No. 39 (Question No. 02.03.01-16)
4) Response to RAI Letter No. 39 (Question No. 02.03.01-17)
5) Response to RAI Letter No. 39 (Question No. 02.03.02-7)
   Enclosure 1 – Met Data File
6) Response to RAI Letter No. 39 (Question No. 02.03.02-8)
7) Response to RAI Letter No. 39 (Question No. 02.03.02-9)
8) Response to RAI Letter No. 39 (Question No. 02.03.03-8)
9) Response to RAI Letter No. 39 (Question No. 02.03.04-5)
   Enclosure 1 - ARCON Input / Output Files
10) Response to RAI Letter No. 39 (Question No. 02.03.04-6)
11) Response to RAI Letter No. 39 (Question No. 13.06.01-48)
12) Response to RAI Letter No. 39 (Question No. 13.06.01-49)
13) Response to RAI Letter No. 39 (Question No. 13.06.01-50)
14) Response to RAI Letter No. 39 (Question No. 13.06.01-51)
15) Response to RAI Letter No. 39 (Question No. 02-1)
16) Response to RAI Letter No. 39 (Question No. 17.5-23)

cc: Adrian Muniz, NRC Fermi 3 Project Manager
Jerry Hale, 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 Dept. of Natural Resources & Environment
Radiological Protection Section (w/o Attachments)

Attachment 1
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4868 Revision 2)

RAI Question No. 13.03-54

NRC RAI 13.03-54

Title: Emergency Planning related to 10 CFR Part 30, 40 and 70 licenses FSAR Table 13.4-201 "Operational Programs Required by NRC Regulations," item 14 "Emergency Planning":

(1) Provide an explanation for including the reference to Special Nuclear Materials (SNM) in the "Program Title" column for "Program Source" citations of 10 CFR 30.32 and 40.31.

(2) Provide an explanation for, and listing of, the portions applicable to SNM with respect to regulatory citations 10 CFR 30.32 and 40.31, which address byproduct and source material.

(3) Provide an explanation for why SNM is referenced in Table 13.4-201 under item 14 (in Program Title column and in the "Milestone" column) with no reference to 10 CFR Part 70 in the "Program Source" column or "Requirement" column. If a 10 CFR Part 70 license is to be referenced in the "Program Title" column, the "Milestone" column and "Requirement" column, describe/list the applicable portions of the Emergency Preparedness program to be implemented at each milestone for receipt of fuel and prior to fuel load.

Response

The following response addresses Parts 1, 2, and 3 of the above RAI.

In the Fermi response to RAI No. 01-2 in Detroit Edison Letter NRC3-09-0025, dated September 24, 2009 (ML092720656), Detroit Edison revised Item 14, "Emergency Planning," of FSAR Table 13.4-201 to include "(portions applicable to SNM)" in the "Program Title" column and citations of 10 CFR 30.32 and 10 CFR 40.31 in the "Program Source" column. To address NRC concerns raised in RAI 13.03-54, "(portions applicable to SNM)" will be revised to a more general reference of "(portions applicable to radioactive materials)" for Item 14 and also for Item 8, Fire Protection Program; Item 11, Non-Licensed Plant Staff Training Program; and Item 15, Physical Security Program. Additionally, the references to the regulatory citations of 10 CFR 30.32 and 10 CFR 40.31, which address byproduct and source material, will be revised to be more specific to the Emergency Planning requirements, and will also be revised to include a reference to 10 CFR 70.22 as shown in the Proposed COLA revision attached to this RAI response. Specifically, the "Program Source" references will become 10 CFR 30.32(i)(3), 10 CFR 40.31(j)(3), and 10 CFR 70.22(i)(3). These latter references are specific to "possession" of byproduct, source, and special nuclear material, respectively, and thus are considered to be the explicit implementation requirements for possession by Detroit Edison at Fermi 3.

With regard to specific details for "applicable portions of the Emergency Preparedness program to be implemented at each milestone for receipt of fuel and prior to fuel load," 10 CFR 30.32(i)(1)(ii) and 30.32(i)(3); 10 CFR 40.31(j)(1)(ii) and 40.31(j)(3); and 10 CFR 70.22(i)(1)(ii) and 70.22(i)(3) contain requirements that specify the purpose and necessary contents of emergency plans submitted with an application for byproduct, source, and special nuclear material, respectively. Thus, those portions of the emergency plan that fit the criteria within the pertinent regulations are the "applicable portions of the Emergency Preparedness program."

Specifically, 10 CFR 30.32(i)(1)(ii) requires, "An emergency plan for responding to a release of radioactive material." Thus, those portions of the emergency plan that would be necessary to respond to a release of radioactive byproduct material would be required for possession of byproduct material by Detroit Edison at Fermi 3. Similarly, 10 CFR 40.31(j)(1)(ii) requires, "An emergency plan for responding to the radiological hazards of an accidental release of source material and to any associated chemical hazards directly incident thereto." Thus, those portions of the emergency plan that would be necessary to respond to a release of source material and any associated chemical hazards would be required for possession of source material by the licensee at the licensee site. Finally, 10 CFR 70.22(i)(1)(ii) requires, "An emergency plan for responding to the radiological hazards of an accidental release of special nuclear material and to any associated chemical hazards directly incident thereto." Thus, those portions of the emergency plan that would be necessary to respond to a release of special nuclear material and any associated chemical hazards would be required for possession of special nuclear material by the licensee at the licensee site.

Requirements for the Fermi 3 emergency plan are specified in 10 CFR 30.32(i)(3), 10 CFR 40.31(j)(3), and 10 CFR 70.22(i)(3). Detroit Edison will implement procedures addressing the topics presented in these regulations consistent with applicable provisions in the Fermi 3 Emergency Plan. Accordingly, the procedures will address the following topics:

- Facility description (as required by 10 CFR 30.32(i)(3)(i), 10 CFR 40.31(j)(3)(i), and 10 CFR 70.22(i)(3)(i)).
- Types of accidents (as required by 10 CFR 30.32(i)(3)(ii), 10 CFR 40.31(j)(3)(ii), and 10 CFR 70.22(i)(3)(ii)).
- Classification of accidents (as required by 10 CFR 30.32(i)(3)(iii), 10 CFR 40.31(j)(3)(iii), and 10 CFR 70.22(i)(3)(iii)).
- Detection of accidents (as required by 10 CFR 30.32(i)(3)(iv), 10 CFR 40.31(j)(3)(iv), and 10 CFR 70.22(i)(3)(iv).
- Mitigation of consequences (as required by 10 CFR 30.32(i)(3)(v), 10 CFR 40.31(j)(3)(v), and 10 CFR 70.22(i)(3)(v)).
- Assessment of releases (as required by 10 CFR 30.32(i)(3)(vi), 10 CFR 40.31(j)(3)(vi), and 10 CFR 70.22(i)(3)(vi)).
- Responsibilities (as required by 10 CFR 30.32(i)(3)(vii), 10 CFR 40.31(j)(3)(vii), and 10 CFR 70.22(i)(3)(vii)).
- Notification and coordination (as required by 10 CFR 30.32(i)(3)(viii), 10 CFR 40.31(j)(3)(viii), and 10 CFR 70.22(i)(3)(viii)).
- Information to be communicated (as required by 10 CFR 30.32(i)(3)(ix), 10 CFR 40.31(j)(3)(ix), and 10 CFR 70.22(i)(3)(ix)).
- Training (as required by 10 CFR 30.32(i)(3)(x), 10 CFR 40.31(j)(3)(x), and 10 CFR 70.22(i)(3)(x)).

- Safe shutdown (as required by 10 CFR 30.32(i)(3)(xi), 10 CFR 40.31(j)(3)(xi), and 10 CFR 70.22(i)(3)(xi)).
- Exercises (as required by 10 CFR 30.32(i)(3)(xii), 10 CFR 40.31(j)(3)(xii), and 10 CFR 70.22(i)(3)(xii)).
- Hazardous chemicals (as required by 10 CFR 30.32(i)(3)(xiii), 10 CFR 40.31(j)(3)(xiii), and 10 CFR 70.22(i)(3)(xiii)).

Items 8, 11, and 15 will retain their existing Part 30 and Part 40 references, and each will have an appropriate Part 70 (or Part 73) reference added to address special nuclear material. Note that Part 70 does not specifically address security for special nuclear materials since it had already been specifically addressed in Part 73. As such, Part 73 reference is provided for security for the special nuclear materials.

Proposed COLA Revision

See Attached proposed FSAR mark-up for Table 13.4-201

Markup of Detroit Edison COLA
(following 5 pages)

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.

Table 13.4-201 Operational Programs Required by NRC Regulations (Sheet 2 of 8) [STD COL 13.4-1-A] [STD COL 13.4-2-A]

				Implementation	
Item	**Program Title**	**Program Source (Required by)**	**Section**	**Milestone**	**Requirement**
7.	Containment Leakage Rate Testing Program	10 CFR 50.54(o) 10 CFR 50, Appendix J	6.2.6	Prior to fuel load	10 CFR 50, Appendix J Option B – Section III.a **[COM 13.4-004]**
8.	Fire Protection Program	10 CFR 50.48	9.5.1.15	Prior to fuel receipt for elements of the Fire Protection Program necessary to support receipt and storage of fuel onsite. Prior to fuel load for elements of the Fire Protection Program necessary to support fuel load and plant operation.	License Condition **[COM 13.4-005]** **[COM 13.4-006]**
	Replace with Insert #1 (13.03-54) ~~(portions applicable to SNM)~~	10 CFR 30.32 10 CFR 40.31 10 CFR 70.22 (13.03-54)		Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18)	10 CFR 30.32(a) 10 CFR 40.31(a) **[COM 13.4-027]** 10 CFR 70.22(a) (13.03-54)
9.	Process and Effluent Monitoring and Sampling Program:				
	Radiological Effluent	10 CFR 20.1301 and 20.1302	11.5.4.6	Prior to fuel load	License Condition **[COM 13.4-007]**
	Technical	10 CFR 50.34a			
	Specifications/Standard	10 CFR 50.36a			
	Radiological Effluent Controls	10 CFR 50, Appendix I, Section II and IV			
	Offsite Dose Calculation Manual	Same as above	11.5.4.5 11.5.4.8	Prior to fuel load	License Condition **[COM 13.4-009]**
	Radiological Environmental Monitoring Program	Same as above	11.5.4.5	Prior to fuel load	License Condition **[COM 13.4-010]**

Table 13.4-201 Operational Programs Required by NRC Regulations (Sheet 4 of 8) [STD COL 13.4-1-A] [STD COL 13.4-2-A]

Item	Program Title	Program Source (Required by)	Section	Implementation Milestone	Implementation Requirement
11.	Non Licensed Plant Staff Training Program	10 CFR 50.120	13.2.2	18 months prior to scheduled fuel load	10 CFR 50.120(b)
	~~(portions applicable to SNM)~~ Replace with Insert #1 (13.03-54)	10 CFR 30.32 10 CFR 40.31 10 CFR 70.22 (13.03-54)		Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18)	10 CFR 30.32(a) 10 CFR 40.31(a) 10 CFR 70.22(a) (13.03-54) **[COM 13.4-028]**
12.	Reactor Operator Training Program	10 CFR 55.13 10 CFR 55.31 10 CFR 55.41 10 CFR 55.43 10 CFR 55.45	13.2.1	18 months prior to scheduled fuel load	License Condition **[COM 13.4-016]**
13.	Reactor Operator Requalification Program	10 CFR 50.34(b) 10 CFR 50.54(i) 10 CFR 55.59	13.2	Within 3 months after issuance of an operating license or the date the Commission makes the finding under 10 CFR 52.103(g)	10 CFR 50.54(i-1)

Table 13.4-201 Operational Programs Required by NRC Regulations (Sheet 5 of 8) [STD COL 13.4-1-A] [STD COL 13.4-2-A]

Item	Program Title	Program Source (Required by)	Section	Implementation	
				Milestone	**Requirement**
14.	Emergency Planning	10 CFR 50.47 10 CFR 50, Appendix E	13.3	Full participation exercise conducted within 2 years prior to scheduled date for initial loading of fuel	10 CFR Part 50, Appendix E, Section IV.F.2.a(ii)
				Onsite exercise conducted within 1 year prior to the schedule date for initial loading of fuel	10 CFR 50, Appendix E, Section IV.F.2.a(ii)
				Licensee's detailed implementing procedures for its emergency plan submitted at least 180 days prior to scheduled date for initial loading of fuel	10 CFR 50, Appendix E, Section V
				The licensee shall submit a fully developed set of site-specific Emergency Action Levels (EALs) to the NRC in accordance with the NRC-endorsed version of NEI 07-01, Rev. 0, with no deviations. The fully developed site-specific EAL scheme shall be submitted to the NRC for confirmation at least 180 days prior to initial fuel load.	License Condition **[COM 13.4-031]**
	Replace with Insert #1 (13.03-54) ~~(portions applicable to SNM)~~	Replace with Insert #2 (13.03-54) ~~10 CFR 30.32~~ ~~10 CFR 40.31~~		Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18)	Replace with Insert #3 (13.03-54) ~~10 CFR 30.32(a)~~ ~~10 CFR 40.31(a)~~ **[COM 13.4-029]**
15.	Security Program:	10 CFR 52.79(a)(35) 10 CFR 52.79(a)(36)	13.6		
	Physical Security Program	10 CFR 73.55		Prior to fuel receipt	License Condition **[COM 13.4-017]**

Table 13.4-201 Operational Programs Required by NRC Regulations (Sheet 6 of 8) [STD COL 13.4-1-A] [STD COL 13.4-2-A]

Item	Program Title	Program Source (Required by)	Section	Implementation Milestone	Implementation Requirement
		10 CFR 73.56 10 CFR 73.57			
	Safeguards Contingency Program	10 CFR 52.79(a)(36) 10 CFR 73.55 10 CFR 73, Appendix C	13.6	Prior to fuel receipt	License Condition **[COM 13.4-017]**
	Training and Qualification Program	10 CFR 73, Appendix B	13.6	Prior to fuel receipt	License Condition **[COM 13.4-017]**
	Cyber Security Plan	10 CFR 73.54 10 CFR 73.55 10 CFR 52.79(a)(36)	13.6	Prior to fuel receipt	License Condition **[COM 13.4-032]**
	Fitness for Duty (Construction – Mgt & Oversight personnel)	10 CFR 26, Subparts A-H, N, and O	13.7	Prior to on-site construction of safety- or security-related SSCs	License Condition **[COM 13.4-018]**
	Fitness for Duty (Construction – Workers & First Line Supv.)	10 CFR 26 Subpart K	13.7	Prior to on-site construction of safety- or security-related SSCs	License Condition **[COM 13.4-018]**
	Fitness for Duty (Operation)	10 CFR 26	13.7	Prior to fuel receipt	License Condition **[COM 13.4-019]**
	~~(portions applicable to SNM)~~	10 CFR 30.32 10 CFR 40.31 10 CFR 73.1 (13.03-54)	13.6	Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18)	10 CFR 30.32(a) 10 CFR 40.31(a) **[COM 13.4-030]** 10 CFR 73.1(a) (13.03-54)

Replace with Insert #1 (13.03-54)

New Text for COL Application, Part 2 FSAR, Table 13.4-201

Insert #1

(portions applicable to radioactive material)

Insert #2

10 CFR 30.32(i)(3)
10 CFR 40.31(j)(3)
10 CFR 70.22(i)(3)

Insert #3

10 CFR 30.32(i)(1)
10 CFR 40.31(j)(1)
10 CFR 70.22(i)(1)

Attachment 2
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4878 Revision 2)

RAI Question No. 02.03.01-15

NRC RAI 02.03.01-15

This question is related to the applicant's response to RAI 02.03.01-4.

In its response to RAI 02.03.01-4, the applicant states that the 92 tornadoes reported in FSAR Section 2.3.1.3.1.2 is a valid count of tornadoes within the five-county area between January 1, 1950 and December 31, 2007. The applicant also stated that tornado reports were combined and referenced as only a single tornado if the tornado reports indicated that the tornado tracked in a traceable direction between different counties or within the same county during a narrow time period and occurred within 45 minutes of one another.

a. *Contrary to the information provided in RAI response 02.03.01-4, Revision 2 to FSAR Section 2.3.1.3.1.2 states 92 tornadoes were reported in the five-county area between January 1, 1955 and December 31, 2007. Please clarify this apparent discrepancy in dates and revise the FSAR accordingly.*

b. *Two tornadoes occurring in different counties at almost the same time cannot necessarily be counted as one tornado. Please provide a list of the tornadoes occurring within the five-county area indicating which tornado reports were considered unique and which tornado reports were combined.*

Response

a. The date in Section 2.3.1.3.1.2 of the FSAR should read January 1, 1950. The date has been changed to January 1, 1950 in the attached markup to Section 2.3.1.3.1.2 of the FSAR.

b. An updated tornado evaluation was conducted for both the five-county area, and the entire 2-degree latitude/longitude box around the Detroit Edison Fermi site. Table 1 below contains the list of tornadoes in the five-county area indicating which tornadoes are unique and which tornadoes are combined. Tornadoes that are combined span across more than one row in the total magnitude column. Analysis of the latitude/longitude coordinates for each tornado report as well as the timing of each individual tornado report was conducted for both the five-county area as well as the entire 2-degree box surrounding the Fermi site using the National Climatic Data Center Tornado Database. Only tornadoes with matching coordinates or tornadoes within 5 miles of one another over a time period of 30 minutes or less were combined (i.e. considered to be the same tornado). The updated analysis resulted in an increase in the overall number of separate tornadoes, tornado area, and strike probability of tornadoes within both the five-county area and the 2-degree latitude/longitude box. FSAR Section 2.3.1.3.1.3 has been updated to reflect the latest analysis including the number of tornadoes in both the five-county area and the 2-degree box surrounding the Fermi site. Similar analysis and data presented in ER Section 2.7 has also been updated.

Table 1
January 1, 1950 to December 31, 2007 DTE Five-County Area Tornado Events

County	Location or County	Date	Time	Type	Mag	Total Magnitude
WASHTENAW	1 WASHTENAW	7/21/1951	2200	Tornado	F2	F2
WAYNE	1 WAYNE	6/5/1953	1505	Tornado	F0	F0
MONROE	1 MONROE	6/8/1953	1715	Tornado	F4	F4
WASHTENAW	2 WASHTENAW	6/8/1953	1830	Tornado	F3	F3
WASHTENAW	3 WASHTENAW	5/31/1954	1845	Tornado	F0	F0
WAYNE	2 WAYNE	5/31/1954	1930	Tornado	F1	F1
LENAWEE	1 LENAWEE	6/12/1954	1630	Tornado	F0	F0
LENAWEE	2 LENAWEE	4/14/1956	1800	Tornado	F1	F1
WAYNE	3 WAYNE	5/12/1956	1645	Tornado	F0	F0
WAYNE	4 WAYNE	5/12/1956	1755	Tornado	F4	F4
WAYNE	5 WAYNE	8/4/1956	816	Tornado	F1	F1
WAYNE	6 WAYNE	11/20/1957	1650	Tornado	F3	F3
LENAWEE	3 LENAWEE	8/3/1958	1730	Tornado	F0	F0
WASHTENAW	4 WASHTENAW	4/30/1962	1700	Tornado	F1	F2
WASHTENAW	5 WASHTENAW	4/30/1962	1700	Tornado	F2	
LENAWEE	4 LENAWEE	8/26/1962	1625	Tornado	F1	F1
MONROE	2 MONROE	4/17/1963	1820	Tornado	F3	F3
MONROE	3 MONROE	5/8/1964	1605	Tornado	F2	F2
LENAWEE	5 LENAWEE	8/22/1964	1335	Tornado	F3	F3
LENAWEE	6 LENAWEE	8/22/1964	1340	Tornado	F1	F1
LENAWEE	7 LENAWEE	4/11/1965	1850	Tornado	F4	F4
MONROE	4 MONROE	4/11/1965	1915	Tornado	F4	
LENAWEE	8 LENAWEE	4/11/1965	1930	Tornado	F4	F4
MONROE	5 MONROE	4/11/1965	2000	Tornado	F4	
LUCAS	1 LUCAS	4/11/1965	2030	Tornado	F4	F4
MONROE	6 MONROE	4/11/1965	2035	Tornado	F4	
WAYNE	7 WAYNE	6/14/1966	1215	Tornado	F2	F2
WASHTENAW	6 WASHTENAW	4/14/1967	1930	Tornado	F1	F1
MONROE	7 MONROE	3/26/1968	1645	Tornado	F2	F2
WAYNE	8 WAYNE	4/23/1968	1330	Tornado	F0	F0
MONROE	8 MONROE	9/9/1968	1701	Tornado	F2	F2
WASHTENAW	7 WASHTENAW	7/4/1969	1623	Tornado	F3	F3
WAYNE	9 WAYNE	7/4/1969	1625	Tornado	F3	
WASHTENAW	8 WASHTENAW	6/7/1971	1555	Tornado	F2	F2
LENAWEE	9 LENAWEE	8/18/1972	2145	Tornado	F0	F0
MONROE	9 MONROE	6/12/1973	1510	Tornado	F0	F0
LENAWEE	10 LENAWEE	6/16/1973	1805	Tornado	F1	F1
LENAWEE	11 LENAWEE	6/26/1973	1425	Tornado	F0	F0
MONROE	10 MONROE	6/26/1973	1430	Tornado	F2	F2
MONROE	11 MONROE	6/26/1973	1445	Tornado	F2	F2
WAYNE	10 WAYNE	6/26/1973	1502	Tornado	F0	F0
WAYNE	11 WAYNE	6/26/1973	1520	Tornado	F0	F0
MONROE	12 MONROE	6/28/1973	1045	Tornado	F0	F0

Table 1 (continued)
January 1, 1950 to December 31, 2007 DTE Five-County Area Tornado Events

County	Location or County	Date	Time	Type	Mag	Total Magnitude
WAYNE	12 WAYNE	6/28/1973	2015	Tornado	F0	F0
WAYNE	13 WAYNE	8/1/1973	1445	Tornado	F0	F0
WAYNE	14 WAYNE	8/1/1973	1540	Tornado	F0	
WAYNE	15 WAYNE	2/28/1974	1625	Tornado	F2	F2
MONROE	13 MONROE	4/3/1974	1830	Tornado	F2	F2
LENAWEE	12 LENAWEE	4/3/1974	1925	Tornado	F2	F2
LENAWEE	13 LENAWEE	4/3/1974	1930	Tornado	F2	F2
MONROE	14 MONROE	4/3/1974	1956	Tornado	F3	F3
WAYNE	16 WAYNE	7/14/1974	1508	Tornado	F2	F2
WASHTENAW	9 WASHTENAW	5/25/1975	1655	Tornado	F2	F2
WAYNE	17 WAYNE	8/21/1975	1415	Tornado	F0	F0
LENAWEE	14 LENAWEE	3/12/1976	1610	Tornado	F2	F2
LENAWEE	15 LENAWEE	6/24/1976	1725	Tornado	F1	F1
WASHTENAW	10 WASHTENAW	5/22/1977	1335	Tornado	F1	F1
MONROE	15 MONROE	5/31/1977	1235	Tornado	F1	F1
MONROE	16 MONROE	7/4/1977	2107	Tornado	F1	F1
WASHTENAW	11 WASHTENAW	7/19/1977	315	Tornado	F1	F1
WASHTENAW	12 WASHTENAW	5/13/1978	1425	Tornado	F0	F0
LENAWEE	16 LENAWEE	6/20/1979	1641	Tornado	F2	F2
LENAWEE	17 LENAWEE	8/29/1979	1648	Tornado	F1	F1
MONROE	17 MONROE	8/29/1979	1649	Tornado	F0	F0
MONROE	18 MONROE	8/29/1979	1651	Tornado	F1	F1
MONROE	20 MONROE	8/29/1979	1656	Tornado	F1	
MONROE	19 MONROE	8/29/1979	1654	Tornado	F1	F1
LUCAS	2 LUCAS	4/8/1980	1555	Tornado	F2	F2
WAYNE	18 WAYNE	4/8/1980	1615	Tornado	F1	F1
WASHTENAW	13 WASHTENAW	6/2/1980	2335	Tornado	F1	F1
WAYNE	19 WAYNE	7/16/1980	710	Tornado	F2	F2
WASHTENAW	14 WASHTENAW	8/31/1980	1350	Tornado	F1	F1
LUCAS	3 LUCAS	4/17/1981	2020	Tornado	F0	F0
LENAWEE	18 LENAWEE	4/12/1982	2326	Tornado	F0	F0
WASHTENAW	15 WASHTENAW	5/31/1982	2305	Tornado	F1	F1
WASHTENAW	16 WASHTENAW	5/31/1982	2330	Tornado	F0	F0
WASHTENAW	17 WASHTENAW	6/15/1982	1520	Tornado	F3	F3
LENAWEE	19 LENAWEE	5/1/1983	2335	Tornado	F2	F2
LENAWEE	20 LENAWEE	5/1/1983	2337	Tornado	F2	F2
LENAWEE	21 LENAWEE	5/1/1983	2340	Tornado	F2	F2
MONROE	21 MONROE	5/1/1983	2355	Tornado	F1	Fl
WASHTENAW	18 WASHTENAW	7/21/1983	1523	Tornado	F0	F0
WAYNE	20 WAYNE	8/30/1984	440	Tornado	F2	F2
LENAWEE	22 LENAWEE	5/27/1985	5	Tornado	F1	F1
LENAWEE	23 LENAWEE	7/15/1986	2123	Tornado	F0	F0
WAYNE	21 WAYNE	8/2/1986	1340	Tornado	F1	F1
WAYNE	22 WAYNE	9/28/1986	2345	Tornado	F0	F0

Table 1 (continued) January 1, 1950 to December 31, 2007 DTE Five-County Area Tornado Events						
County	**Location or County**	**Date**	**Time**	**Type**	**Mag**	**Total Magnitude**
MONROE	22 MONROE	6/2/1987	1110	Tornado	F1	F1
LENAWEE	24 LENAWEE	6/29/1987	1720	Tornado	F1	F1
WAYNE	23 WAYNE	6/29/1987	1820	Tornado	F1	F1
WAYNE	24 WAYNE	7/20/1987	1915	Tornado	F0	F0
LENAWEE	25 LENAWEE	7/31/1987	1430	Tornado	F0	F0
LENAWEE	26 LENAWEE	4/3/1988	1244	Tornado	F0	F0
WASHTENAW	19 WASHTENAW	4/3/1988	1535	Tornado	F1	F1
LENAWEE	27 LENAWEE	5/15/1988	1719	Tornado	F0	F0
WAYNE	25 WAYNE	7/16/1988	2031	Tornado	F0	F0
WASHTENAW	20 WASHTENAW	8/4/1988	1340	Tornado	F1	F1
WASHTENAW	21 WASHTENAW	6/2/1990	2010	Tornado	F2	F2
MONROE	23 MONROE	8/28/1990	1550	Tornado	F1	F1
WAYNE	26 WAYNE	9/6/1990	1935	Tornado	F0	F0
MONROE	24 MONROE	3/27/1991	2039	Tornado	F0	F0
MONROE	25 MONROE	3/27/1991	2045	Tornado	F0	F0
WAYNE	27 WAYNE	4/16/1992	1403	Tornado	F2	F2
LUCAS	4 LUCAS	7/12/1992	1525	Tornado	F2	F2
MONROE	26 MONROE	9/9/1992	2000	Tornado	F1	F1
WAYNE	28 Detroit	9/3/1993	1705	Tornado	F0	F0
WASHTENAW	22 Pleasant Lake	6/13/1994	1342	Tornado	F2	F2
LENAWEE	28 Blissfield	6/20/1994	1440	Tornado	F0	F0
MONROE	27 Ottawa Lake	4/12/1996	15:57	Tornado	F0	F0
WAYNE	29 Highland Park	7/2/1997	17:00	Tornado	F2	F2
LENAWEE	29 Tipton	3/28/1998	10:58	Tornado	F1	F1
LENAWEE	30 Rome Center	5/23/1999	14:50	Tornado	F1	F1
LUCAS	5 Sylvania	5/9/2000	19:22	Tornado	F1	F1
LENAWEE	31 Addison	6/21/2006	17:10	Tornado	F0	F0
MONROE	28 Estral Beach	6/27/2006	14:34	Tornado	F0	F0
WASHTENAW	23 Ann Arbor	9/30/2006	16:32	Tornado	F0	F0
WASHTENAW	1 Salem	8/24/2007	17:02	Tornado	F0	F0

Proposed COLA Revision

The proposed revisions to the Fermi 3 COLA FSAR Section 2.3 and ER Section 2.7 are identified on the attached markups.

Markup of Detroit Edison FSAR
(following 3 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 FSAR. 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.

therefore may underestimate the count of wind events 50 knots or greater in the region of the Fermi site.

Between January 1, ~~1955~~ 1950 and December 31, 2007, ~~92~~ 110 tornadoes were reported in the five-county area (Reference 2.3-220). All tornadoes are categorized as F0 or stronger on the Enhanced Fujita (EF) scale, thereby containing wind speeds greater than 50 knots (Reference 2.3-221). Additional discussion of tornadoes in the region surrounding the Fermi site is given in Subsection 2.3.1.3.1.3.

2.3.1.3.1.3 **Tornadoes and Waterspouts**

Waterspouts

Waterspouts are considered to be the counterpart of tornadoes, but over large bodies of water. Waterspouts are also much smaller than an average tornado and contain wind speeds that are typically less than 43 knots (80.5 km/hr [50 mph]). In the Fermi region, conditions favorable for waterspout formation are when a cool air mass passes over the warmer air above the waters of Lake Erie. The resulting instability can support the formation of waterspouts, most frequently during the late summer and fall season. A search for reported waterspouts in the NCDC online storm database resulted in eight occurrences off the shoreline of Lucas and Monroe counties since 1993 (Reference 2.3-220). The closest occurance to the Fermi site was a report of several waterspouts off the shoreline of Stony Point in Monroe County on the morning of July 26th, 1998 (Reference 2.3-222). Therefore, waterspouts can occur near and at the Fermi site, but are not considered to be of frequent occurrence.

Tornadoes

"Design-Basis Tornado (DBT) and Tornado Missiles for Nuclear Power Plants" (Regulatory Guide 1.76) published in March 2007, was used to determine the design parameters that should be considered in the event that the most severe tornado strikes the Fermi site. In addition, DBT wind speeds for the Fermi site, utilizing information from the "Tornado Climatology of the United States" (NUREG/CR-4461 Rev. 2) published in February of 2007 are presented here. NUREG/CR-4461 Rev. 2 is an update to Rev. 1 that recalculated the tornado climatology using the EF scale for the time period of 1950 through August 2003. The relationship calculate the strike probability specifically for the Fermi site, a 2-degree latitude/longitude box centered on the location of the Fermi site was chosen to mirror the 2-degree box presented in NUREG/CR-4461 Rev. 2. A 2-degree box centered on the Fermi 3 reactor provides a conservative basis for calculating the probability of a tornado striking the Fermi site. Guidelines for calculating strike probability are presented in NUREG/CR-4461 Rev 2. Following the NUREG/CR-4461 Rev. 2 methodology, the strike probability for a point structure in any given year is given by:

$$Pp = At / NAr \qquad \text{[Eq. 2]}$$

where:

- Pp = Tornado strike probability for a point structure per year, regardless of wind speed
- At = Total area impacted by tornadoes within a region of interest in N years
- N = Number of years of tornado record
- Ar = Area of the region of interest

The 2 degree latitude/longitude box is based on the centerline of the Fermi 3 reactor vessel. The 2-degree box encompasses 13 counties in Michigan, 17 counties in Ohio, and 3 counties in the Canadian Province of Ontario that are either fully or partially inside the box. The number of tornadoes occurring in the 2-degree box was obtained from the NCDC online storm database and Environment Canada database for the 54-year period of January 1, 1950 through December 31, 2003. As shown below, the number of tornadoes for each EF scale class is displayed. On average ~~7.81~~ 9.83 tornadoes per year occurred in the 2-degree box based on the ~~422~~ 531 tornadoes that were reported during the 54-year period (Reference 2.3-220, Reference 2.3-223). The total area impacted by tornadoes in the 2—degree box, shown below, can be found by multiplying the number of tornadoes in each EF scale class by the expected values for tornado segment statistics in the central United States found in Table 2-10 of NUREG/CR-4461 Rev. 2.

	F0	F1	F2	F3	F4	F5	Total
Number of Tornadoes	~~135~~ 172	~~153~~ 193	~~93~~ 120	~~23~~ 26	~~17~~ 19	1	~~422~~ 531

Expected Value of Tornado Area (mi^2) (1)	0.0341	0.3374	1.1784	3.0857	4.7263	6.0152	
A t = Total Tornado Area (mi^2)	~~4.60~~ 5.87	~~51.62~~ 65.12	~~109.59~~ 141.41	~~70.97~~ 80.23	~~80.35~~ 89.80	6.02	~~323.15~~ 388.43

1. From Table 2-10 NUREG/CR-4461 Rev. 2

The total area of the 2-degree box is calculated by summing the areas of Michigan, Ohio, and Canadian counties inside the 2-degree box. County areas provided from the U.S. Census Bureau and Canada's National Statistical Agency estimates a total area of 18,583.87 mi^2 (Reference 2.3-224, Reference 2.3-225). Using a total tornado area of ~~323.15~~ 388.43 mi^2 (At), a 2-degree box area of 18,583.87 mi^2 (Ar), and a time period of 54 years (N), the calculated strike probability (Pp) for the Fermi site becomes ~~3.22~~ 3.87 X 10-4 or a recurrence interval of once every ~~3105~~ 2584 years.

In comparison, Table 5-1 in NUREG/CR-4461 Rev. 2 shows the calculated probability of a tornado striking any point in the central United States as 3.58 X 10-4 or a recurrence interval of once every 2793 years. The results demonstrate that the statistics for the 2-degree box centered on the Fermi site provides an accurate estimate of the probability of a tornado striking the Fermi site rather than utilizing the generalized value for the central United States~~, which incorporates regions that experience tornadoes more frequently~~.

Regulatory Guide 1.76 defines DBT characteristics for nuclear power plants that have a tornado strike probability greater than 1.0 X10-7. The calculated Fermi site tornado strike probability of ~~3.22~~ 3.87 X10-4 exceeds the above probability threshold which requires Fermi 3 to meet the design requirements of Regulatory Guide 1.76. Table 1 from Regulatory Guide 1.76 presents the remaining six DBT characteristics for new reactors located in the United States whose tornado strike probabilities exceed the 1.0 X 10-7 threshold. According to Table 1, since the Fermi site is located in Region I, the DBT characteristics are as follows:

DBT Characteristics	**Fermi site (1)**	**ESBWR DCD (2)**
Maximum wind speed (mph)	230	330
Translational speed (mph)	46	70
Maximum rotational speed (mph)	184	260

Markup of Detroit Edison ER
(following 4 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 ER. 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.

High Wind Events

This section provides the frequency of occurrence of winds greater than 50 knots, in accordance with the Nuclear Regulatory Commission (NRC) Regulatory Guide 4.2. Storm reports that include wind speeds of 50 knots or greater occur with many types of weather phenomenon such as thunderstorms and tornadoes. Wind reports for thunderstorms and tornadoes were obtained from the NCDC on-line storm database for the following five-county area surrounding the Fermi site: Lenawee, Monroe, Washtenaw, Wayne and the Ohio County of Lucas. While not all five counties may have been actively reporting high wind events in the early years of the time period, the 1955-1959 period featured 1.6 high wind events per year. The subsequent 10-year periods of 1960-1969, 1970-1979, and 1980-1989 averaged 2.9, 2.4, and 4.2 high wind events per year respectively. An analysis of the high wind events on a decade by decade basis over the five-county area does not show a significant statistical trend over the first four decades. In fact, the variability in the average number of high wind events per decade over the first four decades may be explained by natural variability as they each reported similar numbers of high wind events.

Furthermore, some of the reported high wind events likely occurred simultaneously in several of the five counties. High wind events can be caused by individual thunderstorms that have a cellular structure or by thunderstorms that have become linear along a squall line or cold front. A line of thunderstorms can cause wind damage along an elongated path, while the wind damage caused by cellular type thunderstorms is typically isolated in nature.

Between January 1, 1955 and December 31, 2007 there have been 816 reports of wind events that were 50 knots or greater in the five-county area (Reference 2.7-29). The highest wind speed reported was 90 knots (103.6 mph) in Wayne and Lucas Counties on July 22, 1960 and July 4, 1969. Many of the reports for high winds contained in the NCDC on-line storm database do not specify wind speeds and therefore may underestimate the count of wind events 50 knots or greater in the region of the Fermi site.

110 Between January 1, 1950 and December 31, 2007, ~~92~~ tornadoes were reported in the five-county area (Reference 2.7-29). All tornadoes are categorized as F0 or stronger on the Enhanced Fujita (EF) scale, thereby containing wind speeds greater than 50 knots (Reference 2.7-30). Additional discussion of tornadoes in the region surrounding the Fermi site is given in Subsection 2.7.3.3.

2.7.3.3 **Tornadoes and Waterspouts**

Waterspouts

Waterspouts are considered to be the counterpart of tornadoes, but over large bodies of water. Waterspouts are also much smaller than an average tornado and contain wind speeds that are typically less than 50 mph. Conditions favorable for waterspout formation are when a cool air mass passes over the warm waters of Lake Erie. The resulting instability can support the formation of waterspouts, most frequently during the late summer and fall season. A search for reported waterspouts in the NCDC online storm database resulted in eight occurrences off the shoreline of Lucas and Monroe counties since 1993 (Reference 2.7-29). The closest occurrence to the Fermi site was a report of several waterspouts off the shoreline of Stony Point in Monroe County on the morning of July 26, 1998 (Reference 2.7-31). Therefore, waterspouts can occur near and at the Fermi site, but are not considered to be of frequent occurrence.

Tornadoes

"Design-Basis Tornado (DBT) and Tornado Missiles for Nuclear Power Plants" (Regulatory Guide 1.76) published in March 2007, was used to determine the design parameters that should be considered in the event that the most severe tornado strikes the Fermi site. In addition, DBT wind speeds for the Fermi site, utilizing information from the "Tornado Climatology of the United States" (NUREG/CR-4461 Rev. 2) published in February of 2007 are presented here. NUREG/CR-4461 Rev. 2 is an update to Rev. 1 that recalculated the tornado climatology using the EF scale for the time period of 1950 through August 2003. The relationship of the damage intensity to the tornado maximum wind speed in the new EF scale is as follows (Reference 2.7-30):

EF0	65-85 mph
EF1	86-110 mph
EF2	111-135 mph
EF3	136-165 mph
EF4	166-200 mph
EF5	201+ mph

The EF scale uses the fastest 3-second wind speeds as opposed to the fastest quarter mile wind speeds used in the original Fujita Scale. The result of this new methodology is lower DBT maximum wind speeds as shown in Table 1 of Regulatory Guide 1.76. NUREG/CR-4461 Rev. 2 also introduces a term to account for the finite dimensions of structures as well as the variation of wind speed along and across the tornado footprint. The seven DBT values deemed critical by Regulatory Guide 1.76 when designing nuclear facilities are as follows:

- Tornado Strike Probability
- Maximum Wind Speed
- Translational Speed
- Maximum Rotational Speed
- Radius of Maximum Rotational Speed
- Pressure Drop
- Rate of Pressure Drop

Tornado Strike Probability

NUREG/CR-4461 Rev. 2 divides the United States into 2-degree latitude/longitude boxes containing the number of tornado events reported from 1950 through August 2003. Figure 5-7 of NUREG/CR-4461 Rev. 2 shows that the Fermi site is located near the center of the 2-degree box bound between the 82 degree and 84 degree West longitudes and the 41 degree and 43 degree North latitudes. Adjacent 2-degree boxes to the west and southwest contain significantly higher numbers of tornado events. However, the 2-degree box that contains the Fermi site includes Lake

Saint Clair and western parts of Lake Erie, which may explain the decreased number of tornado events. In order to calculate the strike probability specifically for the Fermi site, a 2-degree latitude/longitude box centered on the location of the Fermi site was chosen to mirror the 2-degree box presented in NUREG/CR-4461 Rev. 2. A 2-degree box centered on the Fermi 3 reactor provides a conservative basis for calculating the probability of a tornado striking the Fermi site. Guidelines for calculating strike probability are presented in NUREG/CR-4461 Rev 2. Following the NUREG/CR-4461 Rev. 2 methodology, the strike probability for a point structure in any given year is given by:

$$P_p = A_t / NA_r$$

Where:

P_p= Tornado strike probability for a point structure per year, regardless of wind speed

A_t= Total area impacted by tornadoes within a region of interest in N years

N = Number of years of tornado record

A_r= Area of the region of interest

The 2-degree latitude/longitude box is based on the centerline of the Fermi 3 reactor vessel. The 2-degree box encompasses 13 counties in Michigan, 17 counties in Ohio, and three counties in the Canadian Province of Ontario that are either fully or partially inside the box. The number of tornadoes occurring in the 2-degree box was obtained from the NCDC on-line storm database and Environment Canada database for the 54-year period of January 1, 1950 through December 31, 2003. As shown below, the number of tornadoes for each EF scale class is displayed. On average ~~7.81~~ 9.83 tornadoes per year occurred in the 2-degree box based on the ~~422~~ 531 tornadoes that were reported during the 54-year period (Reference 2.7-29 and Reference 2.7-32). The total area impacted by tornadoes in the 2 degree box, shown below, can be found by multiplying the number of tornadoes in each EF scale class by the expected values for tornado segment statistics in the central United States found in Table 2-10 of NUREG/CR-4461 Rev. 2.

	F0	F1	F2	F3	F4	F5	Total
Number of Tornadoes	~~135~~ 172	~~153~~ 193	~~93~~ 120	~~23~~ 26	~~17~~ 19	1	~~422~~ 531
Expected Value of Tornado Area (mi^2) (a)	0.0341	0.3374	1.1784	3.0857	4.7263	6.0152	
Total Tornado Area (mi^2)=A_t	~~4.60~~ 5.87	~~51.62~~ 65.12	~~109.59~~ 141.41	~~70.97~~ 80.23	~~80.35~~ 89.80	6.02	~~323.16~~ 388.43

a) From Table 2-10, NUREG/CR-4461, Rev. 2

The total area of the 2-degree box is calculated by summing the areas of Michigan, Ohio, and Canadian counties inside the 2-degree box. County areas provided from the U.S. Census Bureau and Canada's National Statistical Agency estimates a total area of 18,583.87 mi^2 (Reference 2.7-33 and Reference 2.7-34). Using a total tornado area of ~~323.15~~ 388.43 mi^2 (A_t), a 2-degree box area of

18,583.87 mi^2 (A_r), and a time period of 54 years (N), the calculated strike probability (P_p) for the Fermi site becomes ~~3.22~~ X 10^{-4} or a recurrence interval of once every ~~3105~~ years.

3.87 2584

In comparison, Table 5-1 in NUREG/CR-4461 Rev. 2 shows the calculated probability of a tornado striking any point in the central United States as 3.58 X 10^{-4} or a recurrence interval of once every 2793 years. The results demonstrate that the statistics for the 2-degree boxes centered on the Fermi site provide a more accurate estimate of the probability of a tornado striking the Fermi site rather than utilizing the generalized value for the central United States~~, which incorporates regions that experience tornadoes more frequently~~.

Regulatory Guide 1.76 defines DBT characteristics for nuclear power plants that have a tornado strike probability greater than 1.0 X10^{-7}. The calculated Fermi site tornado strike probability of ~~3.22~~ X10^{-4} exceeds the above probability threshold which requires the Fermi 3 to meet the design requirements of Regulatory Guide 1.76. Table 1 from Regulatory Guide 1.76 presents the remaining six DBT characteristics for new reactors located in the United States whose tornado strike probabilities exceed the 1.0 X 10^{-7} threshold. According to Table 1, since the Fermi site is located in Region I, the DBT characteristics are as follows: 3.87

DBT Characteristics	Fermi site [(a)]
Maximum wind speed (mph)	230
Translational speed (mph)	46
Maximum rotational speed (mph)	184
Radius of maximum rotational speed (ft)	150
Pressure drop (psi)	1.2
Rate of pressure drop (psi/sec)	0.5

a) From Table 1 of Regulatory Guide 1.76

2.7.3.4 **Hail**

A study authored by Joseph T. Schaefer estimates that the 1 x 1 degree box surrounding the Fermi site averages 16.5 reports of severe hail (hail diameter ≥ 0.75 inches) per year (Reference 2.7-35). Schaefer's study examined hail reports from the period 1955-2002. In order to include the most recent five years, hail reports were obtained from the NCDC on line storm database for the Michigan Counties of Lenawee, Monroe, Washtenaw, Wayne, and the Ohio County of Lucas. The five-county area surrounding the Fermi site reported 576 severe hail events over a 53-year period of January 1, 1955 through December 31, 2007 producing an average of 10.9 occurrences of severe hail per year, which is somewhat lower than the findings by Schaefer (Reference 2.7-29). However, the total area of the five-counties is less than that of the 1 x 1 degree box used by Schaefer, and thereby explains the difference among the two estimates.

Out of the 576 severe hail reports, 87 were reported as large hail (hail diameter ≥ 1.75 inches) (Reference 2.7-29). The largest hail report was 4.00 inches, occurring in Wayne County on November 13, 1955 and Monroe County on March 27, 1991. Figure 2.7-2 shows the distribution of severe hail events for each month. The majority of hail events in the five-county area occur during the months of May, June, and July. During the 53 year period there were no reports of hail during the winter months of December and January. Figure 2.7-3 provides the distribution of hail events

Attachment 3
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4878 Revision 2)

RAI Question No. 02.03.01-16

NRC RAI 02.03.01-16

This question is related to the applicant's response to RAI 02.03.01-9.

The applicant's response to RAI 02.03.01-9 presented an evaluation of the winter precipitation roof loads based on ISG-7. In its evaluation of the normal winter precipitation event, the applicant determined the ground-level weight of the historical maximum snowpack for the Fermi site to be 21.0 lb_f/ft^2 based on the maximum snowpack of 24 inches recorded at the Detroit Metropolitan Airport in January 1999. The staff notes that Table C7-1 of ASCE/SEI 7-05 lists a maximum ground snow load of 27 lb_f/ft^2 for Detroit airport. The staff also found an extreme daily snow cover value of 33.0 inches for the Willis 5 SSW COOP station (located approximately 32 km (20 miles) northwest of the Fermi 3 site in Washtenaw County, Michigan) using the NCDC Snow Climatology web site. Using Equation 1 from ISG-7, the staff converted the 33.0 inch snowfall to a snowpack weight of 32.4 lb_f/ft^2. Please justify not using the Willis 5 SSW extreme daily snow cover value of 33.0 inches to derive the weight of the historical maximum snowpack for the Fermi 3 site.

Response

Daily snowpack data was reviewed using the National Climatic Data Center (NCDC) Snow Climatology website in order to find the historic maximum snowpack for the Fermi vicinity. The search confirmed that the historical maximum snowpack for the Fermi vicinity is 33 inches, occurring at the Willis 5 SSW COOP station in southeast Washtenaw County, Michigan during February of 1978. The ground-level weight of the historical maximum snowpack for the Fermi site becomes 32.4 lb_f/ft^2 (0.279 lb_f/ft^2/inch x $33^{1.36}$ inches) using Equation 1 of ISG DC/COL-ISG-07. The 100-year return period snowpack with a ground-level weight of 29.3 lb_f/ft^2 was the Normal Winter Precipitation (NWP) event as presented in the response to RAI 02.03.01-9 in Detroit Edison letter NRC3-10-0003 dated February 8, 2010 (ML100500930). Since the historical maximum snowpack ground-level weight of 32.4 lb_f/ft^2 exceeds the ground-level weight of the 100-year return period snowpack, the ground-level weight of the historical maximum snowpack becomes the NWP event for Fermi 3. This estimate is bounded by the ESBWR standard plant site parameter value (50 lb_f/ft^2) and is shown in the attached markups to FSAR Table 2.0-201.

As a result of this revision to the NWP event for the Fermi site, some of the calculations contained in RAI 02.03.01-9 for the Extreme Winter Precipitation Event (EWP) and Maximum Roof Load have also been revised. The paragraphs that follow contain the revised calculations for the EWP event and Maximum Roof Load.

Extreme Winter Precipitation Event

DCD Tier 1, Table 5.1-1 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. As indicated above, the historical maximum snowpack is the NWP event. Therefore, the combined ground-level weight from the NWP event and EWP event at the Fermi site is 157.2 lb_f/ft^2 (124.8 lb_f/ft^2 + 32.4 lb_f/ft^2). This estimate is bounded by the ESBWR standard plant site parameter of 162 lb_f/ft^2 given in DCD Tier 1, Table 5.1-1.

Maximum Roof Load

The response to RAI 02.03.01-9 evaluated three load combination scenarios 1) the Historical Maximum Snowfall Event on the 100-Year Return Period Snowpack 2) the 48-Hour probable maximum winter precipitation (PMWP) on the 100-Year Return Period Ice Accretion Event and 3) the 48-Hour PMWP on the 100-Year Return Period Snowpack to determine the maximum roof load value for the Fermi 3 site. Since the historical maximum snowpack ground-level weight of 32.4 lb_f/ft^2 exceeds the ground-level weight of the 100-year return period snowpack, the weight of the historical maximum snowpack has been used to reevaluate scenarios 1 and 3 listed above.

For the scenario where the historical maximum snowfall event occurs while the Fermi 3 site is experiencing a historical maximum snowpack, the resulting ground-level weight becomes 51.5 lb_f/ft^2 (19.1 lb_f/ft^2 + 32.4 lb_f/ft^2). This ground-level weight converts to a roof snow load of 39.7 lb_f/ft^2 (0.7 x 1.1 x 1 x 1 x 51.5 lb_f/ft^2).

For the scenario where the 48-Hour PMWP event occurs while the Fermi 3 site is experiencing a historical maximum snowpack, the roof load of the historical maximum snowpack becomes 24.9 lb_f/ft^2 (0.7 x 1.1 x 1 x 1 x 32.4 lb_f/ft^2). The resulting roof load of the 48-hour PMWP on the historical maximum snowpack becomes 154.7 lb_f/ft^2 (124.8 lb_f/ft^2 + 24.9 lb_f/ft^2 + 5 lb_f/ft^2).

Based on the reevaluation of the three roof load scenarios, the roof load resulting from the 48-hour PMWP on the historical maximum snowpack provides a conservative estimate of the maximum roof load resulting from the normal and extreme winter precipitation events for the safety-related structure roofs at the Fermi 3 site. This estimate is bounded by the ESBWR site design parameters shown in Table 3G.1-2 of the ESBWR DCD. From Table 3G.1-2, the maximum roof load resulting from the normal and extreme winter precipitation event is 163.5 lb_f/ft^2 (38.5 lb_f/ft^2 + 125 lb_f/ft^2).

Proposed COLA Revision

The proposed revisions to the Fermi 3 COLA FSAR Table 2.0-201 and FSAR Section 2.3.1.3.4 are identified on the attached markups.

Markup of Detroit Edison COLA
(following 7 pages)

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.

2.3.1.3.4.1 Maximum Ground-Level Weight of the Normal Winter Precipitation Event

The NWP event in the Fermi 3 region can be described by the highest ground-level weight among the 100-year return period snowpack, historical maximum snowpack, 100-year return period snowfall, or historical maximum snowfall. The remainder of this subsection provides the basis for each ground-level weight.

<u>100-Year Return Period Snowpack</u>

During the late fall, winter, and early spring the frequency of surface low pressure systems tracking across southeast Michigan is at a maximum. Each surface low pressure system that passes through the region has the potential to produce heavy snowfall at the Fermi site. SEI/ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures," identifies that the Fermi site is located in a ground snow load zone of 24 lb_f/ft^2 based on a 50-year return period (Reference 2.3-218). In order to convert to a 100-year return period snowpack Table C7-3 of SEI/ASCE 7-05 cites a conversion factor of 1.22 (1/0.82). Using this conversion factor the ground-level weight of the 100-year return period snowpack for the Fermi site becomes 29.3 lb_f/ft^2 (24 lb_f/ft^2 x 1.22).

<u>Historical Maximum Snowpack Event</u>

Snowpack is defined as the amount of measured snow on the ground reported in inches. The NWS measures snowpack on a daily basis at first-order and most COOP stations, reporting it as snow depth. Maximum snow depth measurements were obtained for stations surrounding the Fermi site in order to determine the historical maximum snowpack event. The maximum snowpack recorded is ~~60.96~~ 83.8 cm (~~24~~ 33 inches), occurring at the ~~Detroit Metropolitan Airport in January 1999 (Reference 2.3-201)~~ Willis 5 SSW station in southeast Washtenaw County in February 1978 (Reference 2.3-237). For the Fermi site, using Equation 1 presented in ISG DC/COL-ISG-07, the ground-level weight of the historical snowpack for the Fermi site becomes ~~21.0~~ 32.4 lb_f/ft^2 (0.279 lb_f/ft^2/inch x ~~24~~ 33$^{1.36}$ inches). 33

<u>100-year Return Period Snowfall</u>

The 100-year return period snowfall value is intended to provide an estimate of the maximum snowfall event for meteorological observing stations with an insufficient time interval to capture cyclical extremes. 100-year return period snowfall values are extrapolated from a dataset of maximum snowfall events for the time period of the observing station.

100-year return period snowfall amounts for 2-day periods were obtained from NCDC's Snow Climatology web site for first order and COOP stations in the Fermi region. Utilizing values over a 2-day period ensures that snow events that occur for more than a 1-day recording period are captured. The maximum 100-year return period snowfall for the Fermi region is 46.48 cm (18.3 inches) as obtained from the Flint observing station records (Reference 2.3-237). Determining the ground-level weight of the 100-year return period snowfall is not exact, as snow can vary in density with different air temperatures. A more useful method to determine the ground-level weight of snowfall is to calculate the water equivalent of the falling snow. The snow to water equivalent ratio varies anywhere from 0.2 to 0.4 cm (0.07 to 0.15 inches) for 2.54 cm (1 inch) of snow (Reference 2.3-238). Using 0.15 as a conservative snow to water equivalent ratio and the weight of one inch of water, the weight of the 100-year return period snowfall for the Fermi region is given by:

$$18.3 \text{ in} \times 0.15 \times 5.2 \text{ lb}_f/\text{in ft}^2 = 14.3 \text{ lb}_f/\text{ft}^2$$

Historical Maximum Snowfall Event

In order to determine the historical maximum snowfall event, maximum 24-hour snowfall amounts were obtained for stations surrounding the Fermi site. Subsection 2.3.1.2.4 discussed the maximum 24-hour snowfall values in the Fermi region. The highest 24-hour snowfall amounts for the NWS first order and COOP sites around the Fermi site are displayed in Table 2.3-206. The highest 24-hour snowfall of 63.2 cm (24.5 inches) occurred during April of 1886 and is attributed to the Detroit City Airport in the database. Using 63.2 cm (24.5 inches) as the historical maximum snowfall event, 0.15 as the snow to water equivalent ratio, and the weight of one inch of water, the ground-level weight becomes 19.1 lb_f/ft^2 (24.5 inches x 0.15 x 5.2 lb_f/ft^2).

historical maximum
32.4

Based on the discussion above, the ~~100-year return period~~ snowpack (~~29.3~~ lb_f/ft^2) , provides the maximum ground-level weight of the NWP event. This estimate is bounded by the ESBWR standard plant site parameter valuse (50 lb_f/ft^2) as shown in Table 2.0-201.

2.3.1.3.4.2 **Maximum Ground-Level Weight of the Extreme Winter Precipitation Event**

As indicated in ISG DC/COL-ISG-07, the EWP event is considered to be the highest groundlevel weight resulting from either the extreme frozen winter precipitation event or the extreme liquid winter precipitation event.

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.

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 $lb_f/in\ ft^2$).

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 157.2 ~~154.1~~ lb_f/ft^2 (124.8 lb_f/ft^2 + ~~29.3~~ 32.4 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.

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 ~~48.4~~ lb_f/ft^2, the roof load (p_f) for the historical maximum snowfall on top of the historical maximum ~~100-year return period~~ snowpack becomes 39.7 ~~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 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

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
historical maximum ground-level weight of the ~~100-year return period~~ snowpack on
32.4 safety-related structures at the Fermi site is ~~29.3~~ lb_f/ft^2. Using equation
historical maximum 7-1 from SEI/ASCE 7-05, the roof load of the ~~100-year return period~~
24.9 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 32.4
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
historical maximum load of the 48-hour PMWP on the ~~100-year return period~~ snowpack for design purposes at the Fermi site is determined as:

24.9 124.8 lb_f/ft^2 + ~~22.6~~ lb_f/ft^2 + 5 lb_f/ft^2 = ~~152.4~~ lb_f/ft^2 154.7

Based upon the discussions above, the roof load scenario of the 48-hour
historical maximum 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

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics (Sheet 4 of 28) [EF3 COL 2.0-1-A]

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/ft²)	~~1403~~ 1551 Pa (~~29.3~~ 32.4 lbf/ft²)	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 1551 ~~1403~~ pa (32.4 ~~29.3~~ lbf/ft²) falls within (is lower than) the DCD site parameter value of 2394 pa (50 lbf/ft²).
Maximum Ground Snow Load for Extreme Winter Precipitation Event(5)	7757 Pa (162 lbf/ft²)	~~7378~~ 7527 Pa (~~154.1~~ 157.2 lbf/ft²)	The site characteristic value for maximum ground snow load for Extreme 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. 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 4
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4878 Revision 2)

RAI Question No. 02.03.01-17

NRC RAI 02.03.01-17

This question is related to the applicant's response to RAI 02.03.01-13. The staff finds the response to RAI 02.03.01-13 incomplete.

Revise the FSAR to discuss the impact on plant design and operation due to the Fermi site being located in a $PM_{2.5}$ nonattainment area. For example, discuss whether the increased particulate loading associated with a $PM_{2.5}$ nonattainment area would adversely impact dust loading on HVAC filter systems.

Response

An area is classified as non-attainment for PM2.5 when the ambient concentrations exceed the National Ambient Air Quality Standards (NAAQS) for that pollutant. In 2006, the PM2.5 standard was revised down to 35 $\mu g/m^3$ on a 24-hour basis while the annual standard was left unchanged from 1997 at 15 $\mu g/m^3$. Both the 24-hour and annual standards are based on a 3-year rolling average, but the 24-hour standard also allows the use of the 98th percentile values to be used in the averaging. It is important to recognize that the PM2.5 standards are human health-based standards and not necessarily standards indicative of adverse effects on equipment such as HVAC systems.

Based on the data available when the standards were implemented, Monroe County was designated as being in nonattainment with the NAAQS for PM2.5 (for both the 1997 annual standard and 2006 24-hour standard). The nonattainment designation begins the official process of revising and implementing a new State Implementation Program (SIP) to demonstrate how Michigan plans to bring the county back into attainment. As of the most recently available monitoring data (2006-2008), Monroe County is below the NAAQS for PM2.5 (annual and 24-hour) thereby demonstrating attainment with the standards. However, Michigan cannot simply bring counties in and out of attainment based on the most recent 3-year average ambient concentrations; rather it is a process of reclassification back to attainment. Therefore, even though Monroe County is still officially designated nonattainment due to the SIP process and attainment demonstration requirements, the air quality in the county is no longer in violation of the health-based NAAQS, nor has it been since 2006 according to its annual average PM2.5 monitoring data.

This is identified in a letter from the Michigan Department of Environmental Quality (MDEQ) to the U.S. Environmental Protection Agency (EPA), dated March 4, 2009, which states:

> "Also based on the 2006-2008 data, only one monitor in Southeast Michigan, in Wayne County, is showing nonattainment of the standard. All other monitors in Southeast Michigan, including the eight other monitors in Wayne County, are meeting the $PM_{2.5}$ 24-hour standard. The MDEQ therefore respectfully requests that the counties of Oakland, Macomb, Washtenaw, St. Clair, Livingston, and Monroe be designated as attainment."

Further, as identified in a letter from the MDEQ to the EPA submitting the SIP, dated June 13, 2008,

> "this SIP submittal demonstrates through a weight-of-evidence approach that Michigan's seven counties, designed as non-attainment of the 1997 $PM_{2.5}$ National Ambient Air Quality Standards, will be in attainment by 2010."

This is well in advance of final design, construction, and operation of Fermi 3.

Thus, given that the air quality in Monroe County is not currently in violation of any PM2.5 standards, Michigan's request to designate Monroe County to attainment with respect to the 2006 24-hour standard, and that the entire state of Michigan will be in attainment with the 1997 annual standard prior to construction and operation of Fermi 3, there is no impact on plant design and operation. Further, plant design and operation will be based on actual air quality conditions in existence during the design phase.

Proposed COLA Revision

None.

Attachment 5
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4879 Revision 2)

RAI Question No. 02.03.02-7

NRC RAI 02.03.02-7

The original 2001–2007 onsite meteorological tower database submitted in response to environmental RAI AQ2.7-3 (dated October 30, 2009) was subsequently reviewed by the applicant to confirm the validity of the data as described in the supplemental response to RAI 02.03.04-3 (dated March 30, 2010). After deleting invalid data for 590 hourly measurements, the applicant provided a revised 2001-2007 onsite meteorological tower database in a supplemental response to environmental RAI AQ2.7-3 (dated March 30, 2010). The staff has performed a precursory review of the revised database and has determined that the database still contains errors (see attached file). For example, (1) every 24th hour in the current day was listed as the 24th hour in the next day (e.g., 200100224 should have been labeled 200100124); (2) several hours with missing data were incorrectly labeled (e.g., 200110609 was listed as 200110624); and (3) some ambient and dew point temperatures were out of range or drastically different from the surrounding data (e.g., 200325318 and 200513108). Note that the staff did not review all parameters in the revised data file. Although the data with mislabeled hours may not affect any of the onsite data statistics or analyses presented in the FSAR, the hours of data that were out of range or drastically different from the surrounding data could significantly affect the FSAR summary tables for mean and extreme values.

Please review the revised 2001-2007 onsite meteorological database for mislabeled hours and for data that were out of range and drastically different from the surrounding data and revised the database accordingly. Indicate the revisions that were made and provide a copy of the revised database. Revise any FSAR tables, figures, and analyses that may have been impacted by this second revision to the onsite database.

Response

1) The raw meteorological data files were reviewed. The review confirmed that the 2400 designation is used to represent time 0000 for each day. The analyses and evaluations which utilize the meteorological data are not affected as these analyses and evaluations do not rely on the time designations. The format has been changed to the 0-23 hour format. The 2400 hour designation is now listed as hour 0000 in the revised database.

2) The meteorological data for years 2001-2007 provided to the NRC were reviewed to evaluate this question. Of the more than 61,000 data entries, four (4) instances were identified where the hour 2400 is inserted out of place. These four instances are shown in the attached Table 1. As shown all four instances occur in April 2001. For all four times, the meteorological data fields are replaced with all 999s; indicating that it is not used in any analysis or evaluations, with the exception of the evaluations of overall percentages of available data.

3) A comprehensive review of the meteorological database was conducted to identify instances where ambient and dew point temperatures may be out of range. The methodology used to review the data included analyzing the ambient and dew point temperature change from hour to hour. Those hours that had a temperature change of ± 3 degrees Celsius were flagged for further analysis. The hourly temperature change of ± 3 degrees Celsius was used because it captures temperature and moisture changes associated with phenomena such as warm frontal passages, cold frontal passages, and precipitation events; while also flagging instrument malfunctions.

Therefore, a 3 degree Celsius temperature change would be expected to capture questionable hours including instrument failures.

The hours flagged as having a temperature change of ± 3 Celsius were individually evaluated by comparing previous or subsequent meteorological parameters. The Detroit Metro hourly observations were used to supplement the investigation as needed to determine if there was a meteorological explanation for the temperature change.

The review of the meteorological data indentified 25 hours in the 2001-2007 database that contained questionable ambient or dew point temperature values when compared to their surrounding hourly values. The 25 hours are shown in the attached Table 2 and equate to 0.04% of the over 60,000 observations contained in the 2001-2007 meteorological database.

The data review which removed ambient temperatures and dew points does not have an impact on the SACTI modeling analysis. Removing hours of data from the meteorological dataset used in SACTI modeling only reduces the predicted model impacts, since fewer hours are available to analyze. The JFD tables presented in the supplemental response to RAI 02.03.04-3 in Detroit Edison letter NRC3-10-0015 dated March 30, 2010 (ML100960474) remain valid. The review of the meteorological data found no additional hours where wind speed, wind direction, or stability were considered questionable. FSAR Table 2.3-212 and ER Table 2.7-23, Monthly and Annual Dew-point Temperature Summaries for the Fermi Site, have been revised as a result of removing hours of questionable ambient temperature and dew point data.

Table 1

MO	DA	Julian Day	YR	TIME	Wind Speed 10m (mph)	Wind Speed 10m (m/s)	Wind Dir 10m (°)	Air Temp 10m (°)	Dew Point (°)	Wind Dir Corrected 10m (°)	Delta Temp (°C 50m)	Delta Temp (°C 100m)	Stability Class (A-G)
4	15	105	2001	0800	11.7	5.2	94.0	9.4	2.0	94.0	-0.5	-1.0	D
4	15	105	2001	2400	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999
4	15	105	2001	1000	8.2	3.7	91.2	8.6	2.6	91.2	-0.4	-0.8	D
4	16	106	2001	0800	5.5	2.5	218.6	5.7	2.1	218.6	-0.5	-1.0	D
4	16	106	2001	2400	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999
4	16	106	2001	1000	5.4	2.4	237.1	6.2	3.5	237.1	-0.5	-1.0	D
4	19	109	2001	1700	9.3	4.2	108.2	9.9	1.0	108.2	-0.8	-1.6	C
4	19	109	2001	2400	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999
4	19	109	2001	1900	8.7	3.9	113.0	9.1	0.9	113.0	-0.5	-1.0	D
4	22	112	2001	0700	3.4	1.5	332.7	17.3	10.4	332.7	0.0	0.0	E
4	22	112	2001	2400	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999.0	999
4	22	112	2001	0900	3.3	1.5	41.6	17.9	9.8	41.6	-0.6	-1.2	C

Table 2

MO	DA	Julian Day	YR	TIME	PARAMETER
10	10	283	2002	1500	The dew point,10-meter & 60 meter temperatures
10	15	288	2002	1000	Dew point
10	15	288	2002	1200	Dew point
10	15	288	2002	1500	10-meter & 60 meter temperatures
5	23	143	2003	1500	Dew point
9	10	253	2003	1700	The dew point,10-meter & 60 meter temperatures
9	10	253	2003	1800	The dew point,10-meter & 60 meter temperatures
9	26	269	2003	0200	The dew point,10-meter & 60 meter temperatures
10	1	274	2003	1600	Dew point
10	1	274	2003	1800	Dew point
11	4	308	2003	1400	The dew point,10-meter & 60 meter temperatures
11	7	311	2003	1600	Dew point
11	12	316	2003	0900	Dew point
11	12	316	2003	1000	Dew point
1	6	6	2004	0200	The 10-meter temperature sensor is stuck.
1	6	6	2004	0300	The 10-meter temperature sensor is stuck.
1	6	6	2004	0400	The 10-meter temperature sensor is stuck.
1	6	6	2004	0500	The 10-meter temperature sensor is stuck.
1	6	6	2004	0600	The 10 and 60 meter temperature sensors are stuck.
1	6	6	2004	0700	The 10 and 60 meter temperature sensors are stuck.
1	6	6	2004	0800	The 10 and 60 meter temperature sensors are stuck.
5	11	131	2005	0600	The dew point,10-meter & 60 meter temperatures
5	11	131	2005	0700	Dew point
5	11	131	2005	0800	Dew point
5	11	131	2005	0900	Dew point

Proposed COLA Revision

See attached markups for proposed COLA revisions to the FSAR and the ER.

Markup of Detroit Edison FSAR
(following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 FSAR. 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.

Table 2.3-212 Monthly and Annual Dew-point Temperature (°F) Summaries for the Fermi Site (2003 - 2007) [EF3 COL 2.0-8-A]

	Mean Dew-point	Measured Dew-point Extremes Maximum	Measured Dew-point Extremes Minimum	Mean Dew-point Diurnal Range
January	16.6	50.2	-14.7	11.3
February	15.7	45.4	-14.5	10.8
March	24.5	57.2	-14.8	10.7
April	33.3	56.1	8.9	9.7
May	45.1	69.0	18.0	~~10.4~~ ← 10.2
June	54.7	71.1	35.8	9.0
July	58.1	72.4	38.8	8.1
August	58.1	74.7	36.7	7.7
September	51.3	68.1	~~28.4~~ ← 30.0	~~8.8~~ ← 8.7
October	40.6	66.0	~~-5.4~~ ← 19.9	~~9.5~~ ← 9.3
November	31.7	58.8	-6.4	~~10.8~~ ← 10.5
December	21.7	50.2	-21.8	9.4
Annual	37.6	74.7	-21.8	~~9.7~~ ← 9.6

Markup of Detroit Edison ER
(following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 ER. 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.

Table 2.7-23 Monthly and Annual Dew-point Temperature (°F) Summaries for the Fermi Site (2003 - 2007)

	Mean Dew-point	Measured Dew-point Extremes		Mean Dew-point Diurnal Range
		Maximum	Minimum	
January	16.6	50.2	-14.7	11.3
February	15.7	45.4	-14.5	10.8
March	24.5	57.2	-14.8	10.7
April	33.3	56.1	8.9	9.7
May	45.1	69.0	18.0	~~10.4~~ ← 10.2
June	54.7	71.1	35.8	9.0
July	58.1	72.4	38.8	8.1
August	58.1	74.7	36.7	7.7
September	51.3	68.1	~~28.4~~ ← 30.0	~~8.8~~ ← 8.7
October	40.6	66.0	~~-5.4~~ ← 19.9	~~9.5~~ ← 9.3
November	31.7	58.8	-6.4	~~10.8~~ ← 10.5
December	21.7	50.2	-21.8	9.4
Annual	37.6	74.7	-21.8	~~9.7~~ ← 9.6

NRC3-10-0036
RAI Question No. 02.03.02-7

Enclosure 1

Met Data File
(CD inventory included on following pages)

Met Data File

Directory of D:\

08/26/2010 08:30 AM <DIR> Fermi_Met_Data
0 File(s) 0 bytes
1 Dir(s) 0 bytes free

Directory of D:\Fermi_Met_Data

08/26/2010 08:30 AM <DIR> .
08/26/2010 08:30 AM <DIR> ..
08/26/2010 08:30 AM 9,938,036 2001-2007 DTE Fermi NRC Format Met Data August 2010.txt

1 File(s) 9,938,036 bytes
2 Dir(s) 0 bytes free

Attachment 6
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4879 Revision 2)

RAI Question No. 02.03.02-8

NRC RAI 02.03.02-8

FSAR Table 2.3-211 presents 2003-2007 monthly and annual temperature data for Detroit Metropolitan Airport using data compiled from the NCDC Integrated Surface Hourly Database (ISHD) (FSAR Reference 2.3-229). It appears that, for several months, not all the extreme values have been appropriately identified. For example, FSAR Table 2.3-211 lists a minimum temperature of –4.0°F (-20.0°C) for January, but the staff found a lower minimum temperature of –5.1°F (–20.6°C) on January 25, 2004 at 08:54 UTC (GMT). Please review the Detroit Metropolitan Airport ISHD to ensure all extreme data values have been identified.

Response

The data used to create the maximum, minimum, and average temperatures for each month during the period 2003-2007 for Detroit Metropolitan Airport was obtained from the National Climatic Data Center (NCDC). The Integrated Surface Hourly Database (ISHD) full format was downloaded from CD-ROM disks purchased from NCDC and then converted into the ISHD abbreviated format using a method developed by NCDC. The data from the ISHD abbreviated format was then used to develop the minimum, maximum, and average temperature data in FSAR Table 2.3-211.

A comparison of the temperature data between the ISHD full and abbreviated formats was performed to identify if Table 2.3-211 contains the extreme values of temperature. During the comparison, an apparent discrepancy was identified when ambient and dewpoint temperatures were below 0°F. For example, on January 25, 2004 at 08:54 UTC (GMT) the ISHD full format data indicates a minimum temperature of -20.6°C (-5.1°F), while the ISHD abbreviated format indicates a minimum temperature of -20.0°C (-4.0°F). Further comparisons were performed for other periods of time during 2003-2007 that confirmed that this discrepancy occurs when the temperature is below 0°F.

The apparent discrepancy was communicated to NCDC to ensure that the agency was aware of the issue. NCDC responded that they investigated the finding and determined that the application contained a coding error. NCDC indicated that the ISHD team is working on creating a patch to resolve the issue.

In order to identify the correct average temperatures and temperature extremes for Table 2.3-211, the ISHD full format data was analyzed. FSAR Table 2.3-211 has been updated (see the attached markup) with values of temperature from the ISHD full format. Several of the maximum, minimum, and average temperatures in Table 2.3-211 have changed due to the apparent discrepancy for ambient temperatures below 0°F and since multiple observations per hour were analyzed using the ISHD full format. Corresponding updates are also provided for ER Table 2.7-22.

The updates to FSAR Table 2.3-211 and ER Table 2.7-22 do not affect the analysis presented in FSAR Section 2.3 or ER Section 2.7. Additionally, the discrepancy noted above concerning the ISHD abbreviated format data tables does not affect other climatological data presented in the Fermi 3 COLA.

Proposed COLA Revision

The proposed COLA revisions for FSAR Table 2.3-211 and ER Table 2.7-22 are provided in the attached markups.

Markup of Detroit Edison FSAR
(following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 FSAR. 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.

Table 2.3-211 Monthly and Annual Temperature Data (°F) for Detroit Metropolitan Airport and Fermi Site (2003 - 2007) [EF3 COL 2.0-8-A]

Period		Upper Level – 60-m Fermi Site	Lower Level – 10-m Fermi Site	Single Level – 10-m Detroit Metropolitan Airport [(A)]	
January	Mean	25.7	26.2	~~26.2~~ ←	27.4
	Maximum	57.8	55.6	~~58.0~~ ←	57.9
	Minimum	-0.6	-3.8	~~-4.0~~ ←	-5.1
February	Mean	25.2	25.8	~~25.9~~ ←	26.1
	Maximum	53.5	53.3	~~57.0~~ ←	57.2
	Minimum	-4.1	-3.5	~~-3.0~~ ←	-4.0
March	Mean	35.8	35.9	~~37.2~~ ←	37.1
	Maximum	76.9	78.5	81.0	
	Minimum	-2.9	-2.9	~~-2.0~~ ←	-2.9
April	Mean	47.9	48.4	~~49.7~~ ←	49.3
	Maximum	86.9	85.5	86.0	
	Minimum	19.8	20.5	21.0	
May	Mean	57.9	58.4	~~59.3~~ ←	59.2
	Maximum	85.0	88.0	~~91.0~~ ←	91.4
	Minimum	34.3	33.6	32.0	
June	Mean	68.7	69.2	69.7	
	Maximum	91.8	94.2	95.0	
	Minimum	44.5	42.3	~~40.0~~ ←	39.9
July	Mean	72.5	73.1	73.5	
	Maximum	91.9	94.3	95.0	
	Minimum	52.3	52.2	50.0	
August	Mean	71.8	72.2	~~72.5~~ ←	72.3
	Maximum	92.0	93.7	~~97.0~~ ←	96.8
	Minimum	51.9	51.7	52.0	
September	Mean	65.4	65.6	~~65.3~~ ←	65.2
	Maximum	83.7	85.8	90.0	
	Minimum	37.2	39.1	39.0	
October	Mean	53.8	53.9	~~53.4~~ ←	53.5
	Maximum	85.7	87.4	~~90.0~~ ←	89.6
	Minimum	31.8	32.0	~~31.0~~ ←	31.5
November	Mean	42.3	42.6	~~42.5~~ ←	42.3
	Maximum	72.4	72.1	75.0	
	Minimum	12.4	13.5	~~13.0~~ ←	12.2
December	Mean	30.6	31.0	~~31.1~~ ←	31.2
	Maximum	56.8	57.5	59.0	
	Minimum	-2.0	-2.4	~~-2.0~~ ←	-2.9
Annual	Mean	50.0	50.3	~~50.7~~ ←	50.2
	Maximum	92.0	94.3	~~97.0~~ ←	96.8
	Minimum	-4.1	-3.8	~~-4.0~~ ←	-5.1

Source A: Reference 2.3-229

Markup of Detroit Edison ER
(following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 ER. 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.

Table 2.7-22 Monthly and Annual Temperature Data for Detroit Metropolitan Airport and Fermi Site (2003 - 2007) (°F) (Sheet 1 of 2)

Period		Upper Level – 60-Meter Fermi Site	Lower Level – 10-Meter Fermi Site	Single Level–10 m Detroit Metropolitan Airport
January	Mean	25.7	26.2	~~26.2~~ ← 27.4
	Maximum	57.8	55.6	~~58.0~~ ← 57.9
	Minimum	-0.6	-3.8	~~-4.0~~ ← -5.1
February	Mean	25.2	25.8	~~25.9~~ ← 26.1
	Maximum	53.5	53.3	~~57.0~~ ← 57.2
	Minimum	-4.1	-3.5	~~-3.0~~ ← -4.0
March	Mean	35.8	35.9	~~37.2~~ ← 37.1
	Maximum	76.9	78.5	81.0
	Minimum	-2.9	-2.9	~~-2.0~~ ← -2.9
April	Mean	47.9	48.4	~~49.7~~ ← 49.3
	Maximum	86.9	85.5	86.0
	Minimum	19.8	20.5	21.0
May	Mean	57.9	58.4	~~59.3~~ ← 59.2
	Maximum	85.0	88.0	~~91.0~~ ← 91.4
	Minimum	34.3	33.6	32.0
June	Mean	68.7	69.2	69.7
	Maximum	91.8	94.2	95.0
	Minimum	44.5	42.3	~~40.0~~ ← 39.9
July	Mean	72.5	73.1	73.5
	Maximum	91.9	94.3	95.0
	Minimum	52.3	52.2	50.0
August	Mean	71.8	72.2	~~72.5~~ ← 72.3
	Maximum	92.0	93.7	~~97.0~~ ← 96.8
	Minimum	51.9	51.7	52.0
September	Mean	65.4	65.6	~~65.3~~ ← 65.2
	Maximum	83.7	85.8	90.0
	Minimum	37.2	39.1	39.0

Table 2.7-22 Monthly and Annual Temperature Data for Detroit Metropolitan Airport and Fermi Site (2003 - 2007) (°F) (Sheet 2 of 2)

Period		Upper Level – 60-Meter Fermi Site	Lower Level – 10-Meter Fermi Site	Single Level–10 m Detroit Metropolitan Airport
October	Mean	53.8	53.9	~~53.4~~ ← 53.5
	Maximum	85.7	87.4	~~90.0~~ ← 89.6
	Minimum	31.8	32.0	~~31.0~~ ← 31.5
November	Mean	42.3	42.6	~~42.5~~ ← 42.3
	Maximum	72.4	72.1	75.0
	Minimum	12.4	13.5	~~13.0~~ ← 12.2
December	Mean	30.6	31.0	~~31.1~~ ← 31.2
	Maximum	56.8	57.5	59.0
	Minimum	-2.0	-2.4	~~-2.0~~ ← -2.9
Annual	Mean	50.0	50.3	~~50.7~~ ← 50.2
	Maximum	92.0	94.3	~~97.0~~ ← 96.8
	Minimum	-4.1	-3.8	~~-4.0~~ ← -5.1

Source: Reference 2.7-41

Attachment 7
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4879 Revision 2)

RAI Question No. 02.03.02-9

NRC RAI 02.03.02-9

FSAR Tables 2.3-224 through 2.3-229 and 2.3-236 through 2.3-241 present wind direction persistence summaries for winds blowing from the same 67.5° (three adjoining 22.5°) wind direction sector. The staff is unable to reproduce the results in these tables. Please describe the methodology used to derive these tables.

Response

FSAR Tables 2.3-224 through 2.3-229 and 2.3-236 through 2.3-241 present wind direction persistence summaries for winds blowing from the same 67.5° wind direction sector at the 10 meter and 60 meter levels, respectively, at the Fermi 3 site. The wind persistence tables are based on hourly wind speed and direction data obtained from the Fermi meteorological tower sensors. The methodology used to create the tables includes evaluating each hour and all 16 compass wind directions and identifying occurrences where the wind direction persisted within the same 67.5° wind direction sector for more than one hour. Figure 1 presents a flowchart displaying the steps used to identify consecutive hours where the wind direction blew from the same 67.5° wind direction sector. For this analysis a persistent wind is defined as wind that blows from the same 67.5° sector as set by the wind direction of the first hour of a persisting set of winds. The wind direction of the first hour is also used to determine which single sector wind direction column the persistent wind is classified to blow from. The paragraphs that follow describes in greater detail the steps presented in Figure 1.

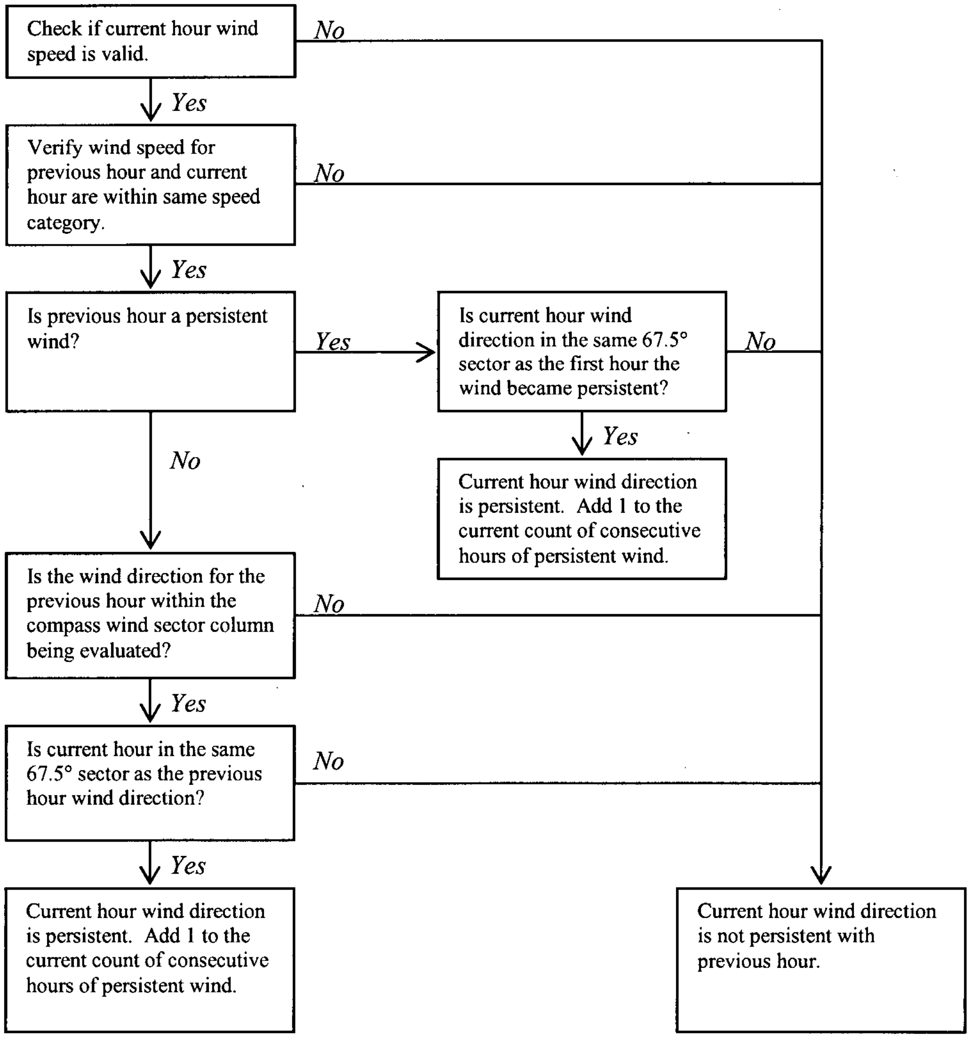
As indicated in Figure 1, the first step is to check if the wind speed parameter is a valid number. If the data is missing then the wind direction for that hour is not considered persistent. If the wind speed is a valid number, then the next step is to verify that the previous hour and the current hour wind speed are within the same wind speed category. Separate tables are used to account for each of the wind speed categories (i.e., 0-5 mph, 5-10 mph, 10-15 mph, 15-20 mph, greater than 20 mph, and all wind speeds). For example, FSAR Table 2.3-225 displays the number of occurrences when the wind was blowing from the same 67.5° wind direction sector when the wind speed was greater than zero but less than or equal to 5 mph. For Tables 2.3-224 and 2.3-236, the determination if the wind is blowing from the same 67.5° sector is made without regard to the current and previous hour wind speed.

The third step is to determine if the wind for the previous hour is persistent. If the previous hour wind direction is persistent then this indicates that the wind has blown from the same 67.5° wind direction sector for at least two consecutive hours. For this scenario, the current hour would also be considered persistent if it blows from the same 67.5° wind direction sector as the first hour the wind became persistent. If the previous hour wind direction is not persistent, then the wind direction for the previous hour and current hour are compared to determine if they are blowing from the same 67.5° wind direction section. If they are, then the compass wind direction for the previous hour is used to determine whether future hours blow within the same 67.5° wind direction sector and to see if its wind direction is within the compass wind direction column (i.e., N, NNW, NNE, etc.) being evaluated. If one of the conditions is not met, then the current hour wind direction is not considered persistent.

The steps indicated in Figure 1 are repeated for each of the 16 compass directions and for each hour of the 2003-2007 time period. In other words, a specific compass wind direction is chosen, such as North, and all hours of the time period are evaluated to identify persistent wind occurrences which have their first hour blowing from the North direction. This process is then repeated for the remaining compass wind directions.

After all hours are analyzed, additional tables then tabulate the number of times each persistent wind occurs based on the length of time (hours) and for each of the 16 wind directions. These tables for each year of the time period 2003-2007 are then combined into single tables for each wind speed category. The tables for each wind speed category for the five year period are then used to calculate the percent of persistent winds and percent of persistent direction for each wind speed category, as well as the longest persistent wind and average persistent hours for the all wind speed category. The resulting tables are displayed in FSAR Tables 2.3-224 through 2.3-229 and 2.3-236 through 2.3-241.

Figure 1
Logic Used to Identify Consecutive Hours Where Wind Blew From the Same 67.5° Wind Direction Sector [1]



1) The steps in the flowchart are repeated for each of the 16 compass wind directions for each hour of the 2003-2007 time period. In other words, a specific compass wind direction is chosen, such as North, and all hours of the time period are evaluated to identify persistent wind occurrences which have their first hour blowing from the North direction. This process is then repeated for the remaining compass wind directions.

Proposed COLA Revision

None.

Attachment 8
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4880 Revision 2)

RAI Question No. 02.03.03-8

NRC RAI 02.03.03-8

This question is related to the applicant's response to RAI 02.03.03-2. The staff finds the applicant's response to RAI 02.03.03-2 incomplete.

The staff asked the applicant in RAI 02.03.03-2 to verify the instrumentation performance information provided in FSAR Table 2.3-289, including sensor specifications and system accuracies. The staff also asked the applicant to identify any deviations from the guidance provided in RG 1.23.

The applicant's response to RAI 02.03.03-2 updated the information in FSAR Table 2.3-289 regarding the meteorological tower's sensor manufacturer and model numbers, channel ranges, system accuracies, sensor starting thresholds, and channel measurement resolution. FSAR Section 2.3.3.1.2 was also revised to state that the accuracies and thresholds for each sensor are within the limits specified in the proposed Revision 1 to RG 1.23 (September 1980).

FSAR Table 1.9-202 is intended to evaluate the applicant's conformance with the applicable Division 1, 4, 5, and 8 RGs in effect six months prior to the submittal of the Fermi 3 COL application. Included in FSAR Table 1.9-202 is an evaluation regarding the applicant's conformance to Revision 1 to RG 1.23 (March 2007).

a. *Revision 2 to FSAR Table 2.3-289 lists the differential temperature (ΔT) channel as having a system accuracy of ±0.15 °C which exceeds the Revision 1 to RG 1.23 (March 2007) specified accuracy of ±0.1 °C. Please revise the FSAR to address the ΔT channel nonconformance with the system accuracy specified in Revision 1 to RG 1.23 (March 2007), including the impact this nonconformance may have on any analyses presented in FSAR Section 2.3.*

b. *FSAR Section 2.3.3.1 .1 states the sensors for the existing preoperational meteorological monitoring program are mounted on booms that are greater than one tower width away from the tower. Likewise, FSAR Section 2.3.3.2.1 states the sensors for the new operational meteorological monitoring program will also be mounted on booms that will be greater than one tower width away from the tower. Revision 1 to RG 1.23 (March 2007) states (1) wind sensors on the side of a tower should be mounted at a distance equal to at least twice the longest horizontal dimension of the tower and (2) temperature sensor shield inlets should at least 1 ½ times the tower horizontal width away from the nearest point on the tower. Please revise the FSAR to clarify whether the preoperational and operational meteorological monitoring programs are in conformance with the boom length criteria specified in Revision 1 to RG 1.23 (March 2007). If the preoperational program is not in conformance with Revision 1 to RG 1.23 (March 2007), please discuss the impact the nonconformance may have on any analyses presented in FSAR Section 2.3.*

c. *Revision 1 to RG 1.23 (March 2007) specifies a digital sampling rate of at least once every 5 seconds. Please revise the FSAR to discuss the digital sampling rates for the existing preoperational meteorological monitoring program and the proposed new operational meteorological monitoring program. If the preoperational monitoring program is not in conformance with RG 1.23 (March 2007), please discuss the impact the nonconformance may have on any analyses presented in FSAR Section 2.3.*

Response

Section 2.3.3 of the Fermi 3 FSAR describes the meteorological monitoring program. For the purposes of discussion within the FSAR, the monitoring program is contained in the following sections:

- Pre-application Meteorological Monitoring Program – FSAR Section 2.3.3.1
- Pre-Operational and Operational Meteorological Monitoring Program – FSAR Section 2.3.3.2

Pre-Application Meteorological Monitoring Program
NUREG 0800, Section 2.3.3, Item II., "Acceptance Criteria," Item 2.b., under "SRP Acceptance Criteria:" states:

> "For COL applications that do not reference an ESP and for ESP applications, at least two consecutive annual cycles (and preferably 3 or more whole years), including the most recent 1-year period, should be provided with the application. If two years of onsite meteorological data are not available at the time the application is filed, the staff expects that the COL or ESP applicant will provide at least one annual cycle of meteorological data collected onsite with the application. These data should be used by the applicant to calculate (1) the short-term atmospheric dispersion estimates for accident releases discussed in SRP Section 2.3.4 and (2) the long-term atmospheric dispersion estimates for routine releases discussed in SRP Section 2.3.5."

The discussion in FSAR Section 2.3.3.1 related to the pre-application monitoring program addresses the data collection in support of the COL application. The Fermi 3 COL development started in early 2007 with a targeted submittal date of September 2008. To support the application, several years of meteorological data obtained from the Fermi 2 meteorological tower were used.

- Five years of data (2003-2007) were used for evaluation of site meteorological characteristics.
- Six years of data (2002-2007) were used for calculating the short-term off-site (PAVAN) and the long-term (XOQDOQ) atmospheric dispersion estimates.
- Seven years of data (2001-2007) were used for calculating the on-site (ARCON96) atmospheric dispersion estimates.

These data sets satisfied the above discussion from NUREG-0800, Section 2.3.3, in that "at least two consecutive annual cycles (and preferably 3 or more whole years), including the most recent 1-year period, should be provided with the application". Furthermore, in support of resolving uncertainties related to the proximity of trees to the meteorological tower, additional meteorological data from 1985-1989 (five years) were used for calculating long-term (XOQDOQ) atmospheric dispersion estimates and on-site (ARCON96) atmospheric dispersion estimates. As described in the supplemental response to RAI 02.03.03-1 in Detroit Edison letter NRC3-10-0015 dated March 30, 2010 (ML100960474), the potential impact from the trees on the 2002-2007 meteorological data for the PAVAN calculations would be conservative. Thus, PAVAN calculations were not performed using the 1985-1989 meteorological data. Therefore, the calculations of atmospheric dispersion estimates have been performed based on up to twelve years of site meteorological data.

As described in the Fermi 2 UFSAR, the 60 meter onsite meteorological tower meets the requirements of Regulatory Guide 1.23, February 1972 (also referred to as Safety Guide 23). This is consistent with the Fermi 2 Technical Requirements Manual (TRM) Bases Section B3.3 which states that the instrumentation is consistent with the recommendations of Regulatory Guide 1.23, February 1972. The Fermi 2 preoperational meteorological program was upgraded for plant operation to provide two independent meteorological trains of instrumentation (primary and secondary) mounted on the 60 meter tower. As part of this upgrade, the instrumentation was designed to comply with Regulatory Guide 1.23, Draft Revision 1, 1980. This instrumentation met or exceeded the licensing basis for the meteorological tower as described in the Fermi 2 UFSAR.

NRC Regulatory Guide 1.23, Revision 1, was issued in March 2007. As indicated above, 2007 was the final year of meteorological data used for the Fermi 3 COL application. The data from the years prior to 2007, including the first quarter of 2007, satisfied the latest approved revision of Regulatory Guide 1.23 (i.e., February 1972). Modifying the meteorological tower to comply with Regulatory Guide 1.23, Revision 1, March 2007, for the final nine months of data, was not practical. Therefore, it is considered acceptable to base the pre-application meteorological monitoring program on Regulatory Guide 1.23 (February 1972).

Relative to the pre-application meteorological monitoring program, the specific items identified in the RAI are addressed as follows:

a. The differential temperature (ΔT) channel on the existing Fermi 2 meteorological tower has a system accuracy of $\pm 0.15°C$, which is consistent with Regulatory Guide 1.23, Draft Revision 1, 1980. Regulatory Guide 1.23, Revision 1, March 2007, specifies an accuracy of $\pm 0.1°C$; however, this version of Regulatory Guide 1.23 was issued during the final year of data collection to support the Fermi 3 COL application. The majority of the meteorological data was gathered from several years prior to 2007 and were consistent with the regulatory guidance in effect at the time. As discussed above, up to twelve years of meteorological data were used in the calculation of atmospheric dispersion estimates. This extensive data set provides assurance that the meteorological data used in the calculations accurately characterize the site, and that calculated atmospheric dispersion estimates are appropriate.

b. As described above, the Fermi 2 meteorological tower is designed to comply with Regulatory Guide 1.23, February 1972. The February 1972 version of Regulatory Guide 1.23 does not specify a recommended length of the boom. Therefore, the tower complies with its licensing basis. Regulatory Guide 1.23, Revision 1, specifies that:

> "wind sensors on the side of a tower should be mounted at a distance equal to at least twice the longest horizontal dimensions of the tower (e.g., the side of a triangular boom)"
>
> and
>
> "The aspirated temperature shields should either be pointed downward or laterally towards the north and shield inlet should be at least 1½ times the tower horizontal width away from the nearest point on the tower."

The majority of the meteorological data was gathered from several years prior to 2007 and was consistent with the regulatory guidance (and the licensing basis) in effect at the time. As discussed above, up to twelve years of meteorological data were used in the calculation of atmospheric dispersion estimates. This extensive data set provides assurance that the meteorological data used in the calculations accurately characterize the site, and that calculated atmospheric dispersion estimates are appropriate.

Further, the meteorological tower for the Fermi site is an open-lattice tower with a width at the base of 20 feet and 9 3/8 inches. The width of the sides of the meteorological tower decreases with height. The open areas in between support frames that are characteristic of an open-lattice tower effectively allows for a larger area for wind to flow through, lessening the area of impact on the sensors, that are mounted on booms, from turbulent flow downwind of the tower structure. Therefore, the effect of the meteorological tower on wind speed and wind direction is minimized since the structure is an open-latticed tower.

c. As described above, the Fermi 2 meteorological tower monitoring equipment is designed to comply with Regulatory Guide 1.23, Draft Revision 1, September 1980. Similar to Regulatory Guide 1.23 Revision 1, March 2007, the September 1980 Draft Revision of Regulatory Guide 1.23 specifies that:

> "The standard deviation of horizontal wind direction fluctuations, sigma theta, should be determined from no less than 180 instantaneous values of lateral wind direction during the recording period (e.g., if the record period is 15 minutes, values sampled at intervals of 5 seconds or less are acceptable; likewise, if the record period is 1 hour, sampling intervals of 20 seconds or less are acceptable)."

The Thermo Westronics Model SV180 digital recorders used for the pre-application meteorological monitoring system samples data at least once every 5 seconds. Therefore, the sampling rate complies with its licensing basis Regulatory Guide 1.23, Draft Revision 1, September 1980 and with Regulatory Guide 1.23, Revision 1 of March 2007.

As described below, the new meteorological tower to be installed during Fermi 3 construction will fully comply with Regulatory Guide 1.23, Revision 1, March 2007.

Pre-Operational and Operational Meteorological Monitoring Program

The discussion in FSAR Section 2.3.3.2 related to the pre-operational and operational monitoring program addresses the configuration of the meteorological tower during plant construction and operation. As described in FSAR Section 2.3.3.2, a new meteorological tower will be erected in the southeast corner of the Fermi site. This new meteorological tower will meet the guidance in Regulatory Guide 1.23, Revision 1, dated March 2007. Section 2.3.3.2.1 (page 2-196) indicates that 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. To comply with Regulatory Guide 1.23, Revision 1, this will be changed to stipulate that the wind sensors will be mounted at a distance equal to at least twice the longest horizontal dimensions of the tower (e.g., the side of a triangular tower) and temperature inlet sensors oriented such that the aspirated temperature shields are either pointed downward or laterally towards the north and shield inlet should be at least 1½ times the tower horizontal width away from the nearest point on the tower.

Proposed COLA Revision

Attached is a markup for the Fermi 3 FSAR to describe how Fermi 3 complies with Regulatory Guide 1.23, Revision 1, March 2007, and provide justification where the pre-application monitoring program does not comply with Regulatory Guide 1.23, Revision 1, March 2007.

A corresponding markup for ER Section 6.4 is also attached.

Markup of Detroit Edison FSAR
(following 15 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 FSAR. 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.

Table 1.9-202 Conformance with Regulatory Guides (Sheet 3 of 25)
[EF3 COL 1.9-3-A]

RG Number	Title	Revision	Date	RG Position	Evaluation
1.21	Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants	Rev. 1	Jun-74	General	Conforms. Subsection 11.4.2.3 (NEI 07-10) and Subsection 11.5.4.5 (NEI 07-09) provide descriptions of the PCP and ODCM, respectively. Implementation milestones are provided in Section 13.4.
1.22	Periodic Testing of Protection System Actuation Functions	Rev. 0	Feb-72	General	Conforms. Operational program implementation is described in Section 13.4.
1.23	Meteorological Monitoring Programs For Nuclear Power Plants	Rev. 1	Mar-07	General	Exception: The RG in part requires that sensors should be located … at a distance of at least 10 times the height of any nearby obstruction if the height of the obstruction exceeds one-half the height of the wind measurement. This criterion is not met for the existing meteorological tower at Fermi 2 and relocation of the tower would be required for construction of Fermi 3 (Refer to Subsection 2.3.3.1.1) Calibration of wind direction sensor does not include test for starting threshold. Refer to Subsection 2.3.3.1.3 for discussion.
1.24	Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Radioactive Gas Storage Tank Failure	Rev. 0	Mar-72	All	Not applicable

The meteorological monitoring program for pre-operational and operational phases complies with RG 1.23, Rev. 1. The meteorological monitoring program used for pre-application complies, for the most part, with RG 1.23, Revision 0 and Draft Revision 1 (Sept. 1980). Specific areas where the pre-application monitoring program do not comply with RG 1.23, Rev. 1, are discussed in Section 2.3.3.1. Specific areas where the pre-application monitoring program do not comply with RG 1.23, Rev. 0, and Draft Rev. 1 (1980), and also do not comply with RG 1.23, Rev. 1 (2007), are as follows:

In addition, the proximity of trees to the existing meteorological tower does not meet this criterion. This is addressed in Section 2.3.3.1.6.

The existing Fermi onsite meteorological tower complies with Regulatory Guide 1.23, Revision 0, February 1972.

complies with

EF3 COL 2.0-9-A 2.3.3 **Meteorological Monitoring**

Except as described in Subsection 2.3.3.1.1 regarding the proximity of trees to the meteorological tower,

The current Fermi onsite meteorological monitoring program has been in place since it was implemented for Fermi 2 pre-operational meteorological assessment beginning in June 1975. ~~Starting in June 1975,~~ the onsite meteorological monitoring program ~~has met the requirements of~~ the proposed Revision 1 to Regulatory Guide 1.23 (September 1980) (Reference 2.3-262). Since June 1975, some of the meteorological monitoring program components have been upgraded. Subsection 2.3.3.1 describes the current state of the onsite meteorological measurement program. The Fermi 2 meteorological monitoring program provides the basis for the Fermi 3 preapplication meteorological monitoring program. In addition, data from the onsite meteorological tower is used as the sole input for models that describe the shortand long-term atmospheric transport and diffusion characteristics of the site, as provided for in NRC Regulatory Guides 1.145 and 1.111, respectively. A description of the model used to analyze the short- and long-term atmospheric transport and diffusion conditions of the site is described in Subsection 2.3.4 and Subsection 2.3.5.

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 as displayed in Figure 2.1-204. Subsection 2.3.3.2 describes the site preparation and construction, pre-operational, and operational meteorological monitoring program proposed for Fermi 3.

The purpose of this section is to identify that the onsite meteorological measurements program and other data-collection programs used by Fermi 3 are adequate to: (1) describe local and regional atmospheric transport and diffusion characteristics within 50 mi (80 km) of the plant, (2) ensure environmental protection, and (3) provide an adequate meteorological database for evaluation of the effects of plant operation. This discussion includes an analysis of the following meteorological monitoring system elements:

- The location of the meteorological tower and instrument siting
- Meteorological parameters measured
- Meteorological sensors
- Instrument surveillance

- System accuracy
- Data recording and transmission
- Data acquisition and reduction
- Data validation and screening
- Data display and archiving
- Data recovery rate and annual and joint frequency distribution of data

The length of the boom complies with Revision 0 of Regulatory Guide 1.23; however, it does not comply with Regulatory Guide 1.23, Revision 1, March 2007, in that the length is less than twice the longest horizontal dimension. As described in Sections 2.3.4 and 2.3.5, up to twelve years of meteorological data were used in the calculation of atmospheric dispersion estimates. This extensive data set provides assurance that the meteorological data used in the calculations accurately characterize the site, and that the calculated atmospheric dispersion estimates are appropriately conservative.

2.3.3.1 Fermi 3 Preapplication Meteorological Monitoring Program

2.3.3.1.1 Tower and Instrument Siting

Figures showing the location of the onsite meteorological tower in respect to offsite meteorological stations and surrounding topography are provided in Figure 2.3-201 of Subsection 2.3.1 and Figure 2.3-256 through Figure 2.3-259 of Subsection 2.3.5, respectively. Figure 2.1-204 of Section 2.1 provides the location of the Fermi site structures in relation to the current onsite meteorological tower. The existing onsite meteorological open-latticed tower is located approximately 339.2 m (1113 ft) west-southwest of the proposed Fermi 3 reactor containment building and has a height of 60.0 m (197 ft) above plant grade. This location is within a distance that is less than 10 times the height of the Fermi 3 reactor building, and therefore does not fully meet the siting criteria of Regulatory Guide 1.23. Accordingly, a new meteorological tower will be built prior to construction of Fermi 3. Subsection 2.3.3.2.1 describes the location of the new meteorological tower. The meteorological parameters specified in Regulatory Guide 1.23 are measured by instrumentation mounted at two levels (10-m (33-ft) and 60-m (197-ft)) of the tower. The 10- and 60-m elevations were selected to approximate the heights of release of activity emanating from ground level and the plant's heat dissipation system, respectively. The meteorological sensors are mounted on booms, ~~which are greater than one tower width away from the tower and are oriented normal to the prevailing wind direction~~. The meteorological sensor types, heights, and location in reference to structures are in conformance with Regulatory Guide 1.23.

, Revision 0, Feb. 1972.

to minimize any impact to downwind measurements.

The influence of terrain near the base of the tower on temperature measurements is minimal. The tower is situated in a relatively flat area. A small climate controlled instrument shelter is located at the base of the

Potential impact of the trees on the analysis is described in Subsection 2.3.3.1.6.

onsite meteorological tower. The tower is situated in an area east of a grove of trees that is located less than ten times the obstruction height recommended in Regulatory Guide 1.23. ~~However, based on analysis of historic wind data collected from the meteorological tower it has been determined that the trees do not impact the wind measurements~~. The tower is located sufficiently close to the shoreline of Lake Erie such that it can measure the dynamic onshore flow conditions that could affect gaseous effluent releases. This effect on the dispersion conditions is representative of the site since the facility itself is located along the western shoreline of Lake Erie.

The accuracy of the differential temperature channel does not comply with Regulatory Guide 1.23, Revision 1, March 2007. Revision 1 of Regulatory Guide 1.23 was issued during the final year of data collection to support the Fermi 3 COL application. The majority of the meteorological data, obtained from several years prior to 2007, were consistent with the regulatory guidance in effect at the time. As discussed in Sections 2.3.4 and 2.3.5, up to twelve years of meteorological data were used in the calculation of atmospheric dispersion estimates. The tower is an open lattice construction. The open areas in between the support frames of the tower minimizes the area of impact to the sensors. The extensive data set and the open lattice design provides assurance that the meteorological data used in the calculations accurately characterize the site, and that the calculated atmospheric dispersion estimates are appropriately conservative.

2.3.3.1.2 Instrumentation and Their Accuracies and Thresholds

Meteorological Sensors

The instrumentation on the meteorological tower consists of the following: wind speed and wind direction sensors at the 10- and 60-m levels, a 10-m air temperature sensor, a 10- to 60-m vertical air temperature difference system (ΔT), and a dewpoint temperature sensor at the 10-m level. In addition, a heated tipping bucket rain gauge monitors precipitation at ground level at the base of the meteorological tower. Table 2.3-288 provides a listing of the meteorological parameters monitored on the Fermi onsite meteorological tower, the sampling height(s), as well as the sensing technique for the primary and secondary systems.

To minimize data loss due to ice storms, external heaters are installed on the primary wind sensors. The heaters are thermostatically controlled and are of the slip-on/slip-off design for easy attachment. The wind sensor specifications are not affected by these heaters. A windscreen is mounted around the precipitation gage to minimize the amount of windblown snow and debris deposited in the gage.

The accuracies and thresholds for the meteorological sensors located on the meteorological tower are presented in Table 2.3-289. The accuracies and thresholds for each sensor are within the limitations specified in the proposed Revision 1 to Regulatory Guide 1.23 (September 1980).

Data Recording Equipment

After the data are collected by the sensors the output is routed through signal conditioning equipment and then directed to digital data recorders. The signal conditioning equipment and digital recorders are located at

The digital recorders sample the data at least once every five seconds.

the base of the 60-m meteorological tower in an environmentally controlled instrument shelter. An analog backup recorder also records the output from the sensors in the event that the primary digital recorder fails. A computer that is connected to the digital recorder, located in the instrument shelter, collects the data from the recorders and sends it to the control room computer system for analysis and archiving. The computer also has the ability to provide an instantaneous readout from the digital recorders so that it can be compared to sensor readings.

The accuracies for the primary and secondary recording devices are presented in Table 2.3-289.

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

2.3.3.1.3 **Instrument Calibration**

The sensors, electronics, and recording equipment are calibrated on a six month basis. More frequent onsite calibrations are performed if the past operating history of the sensor indicates it is necessary. Any necessary adjustments are made onsite and the equipment that malfunctioned is either corrected onsite or replaced with similar spare equipment. After any adjustments or repairs, the calibration is repeated. Electronic calibrations are performed by simulating the output of each of the sensors with precision test equipment and monitoring the recorded values for each parameter. The resistance response to specified temperatures for the temperature thermistors is performed in the laboratory using calibrated measurement equipment. The calibrated temperature thermistor is then used to replace the existing sensor installed on the meteorological tower. The response of the calibrated temperature thermistor is then compared to an ambient temperature measurement taken at the sensor with a calibrated thermometer.

The dew point sensor is calibrated by comparing the result reported by the dew point sensor against the dew point measured by a calibrated, portable dew point hygrometer at the aspirator inlet.

The precipitation sensor is calibrated by comparing the result reported by the precipitation sensor to a known volume of liquid.

The calibration of the wind speed sensors is performed in a wind tunnel by an outside vendor using calibrated measurement equipment and a NIST Traceable Wind Tunnel Anemometer. In the wind tunnel the wind velocity is calibrated at specific points and the starting threshold is determined. The calibrated wind speed sensor is then used to replace the existing sensor installed on the meteorological tower.

The calibration of the wind direction sensor is performed by an outside vendor using calibrated measurement equipment. The calibration does not include a specific test of the starting threshold for wind direction. The starting threshold of the calibrated wind direction sensor is assessed at the time of installation by rotating the wind direction sensor body with the shaft in the horizontal plane and observing that the vane remains stationary. A new bearing is installed in the wind direction sensor if required. After installation of the new wind direction sensor, the directional alignment of the wind direction sensor is checked by sighting a known alignment point and comparing the result reported by the wind direction sensor to a known response. [Add Insert #1 here] The records documenting results of calibrations, drift from calibrations, and corrective action taken for the digital instrumentation are kept and filed onsite.

2.3.3.1.4 **Instrument Service and Maintenance**

Visits are made [periodically] ~~twice a week~~ to the 60-m tower to make a visual inspection of the sensors, as well as the data output and recording equipment in the instrument shelter, to see if they are damaged and need maintenance. In the event the sensors or monitoring equipment is found damaged or malfunctioning, the equipment is replaced or corrected in a timely fashion. A stock of spare parts and equipment is maintained to minimize and shorten the periods of outages. Using the same precision test equipment used for calibration, the instrumentation is checked to ensure reliable operation. Records documenting results of major causes of instrument sensor outages and other malfunctions of the meteorological monitoring system are kept and filed onsite. A similar

Insert 1

Examination of the 2003-2007 meteorological data indicates that there is variability in the wind direction measurements during periods when the wind speed is less than 1 mph, providing assurance that the starting threshold for the wind direction sensor is equal to or less than 1 mph.

inspection and maintenance program is in place for the computers and equipment located in the control room.

2.3.3.1.5 **Data Reduction and Transmission**

The pre-~~operational~~ application meteorological monitoring program is composed of two independent meteorological trains of instrumentation – a primary train and a secondary train – mounted on the 60-m tower. Both trains feed the data acquisition equipment of the Integrated Plant Computer System (IPCS) located in the Fermi 2 control room. The IPCS has the capability to share the meteorological data with other plant computers, display the data on IPCS terminals at various plant locations, and perform plume dispersion analysis in support of emergency response activities. Users can simultaneously access the meteorological data through two available dial-up lines located at the meteorological instrument building. The Nuclear Regulatory Commission (NRC) can also receive selected meteorological data through the Emergency Response Data System (ERDS) interface on IPCS. The operational meteorological monitoring system is described in further detail in the following subsections and is illustrated in Figure 2.3-260.

<u>Signal Conditioning and Data Reduction</u>

Inside the environmentally controlled instrument shelter, sensor signals are conditioned. Each sensor signal requires a single printed-circuit board to perform the necessary conversion, amplification, and scaling to provide a pair of analog outputs for each parameter. Zero and full-scale test switches are front-panel mounted on each printed-circuit board to facilitate parameter testing.

After conditioning through their respective printed-circuit boards, the 10-m horizontal wind direction and vertical wind speed signals pass into the Climatronics Standard Deviation Computer boards to compute the 15-minute average sigma theta and sigma phi.

The primary and secondary signal conditioner and standard deviation computer boards are independent of each other.

<u>Data Transmission</u>

The outputs of the instrument signal conditioning equipment are transmitted to the Control Room via two independent transmission lines. The one line incorporates a phone line between the shelter and the Nuclear Operations Center, where information is microwaved to the

Office Service Building. From the Office Service Building, the signals are transmitted to the Control Room. The second line uses a separate phone line from the shelter to the Nuclear Operations Center, where the data are transmitted to the Office Service Building via a phone line. From the Office Service Building, the signals are transmitted to the Control Room. The two signals are electrically separated from one another from the 60-m tower to the control room. The instrumentation at the 60-m tower is electrically isolated from the equipment in the computer room of the Control Room.

2.3.3.1.6 **Data Acquisition and Processing**

The dual IPCS data acquisition multiplexers accept two trains of data from the meteorological system primary and secondary data acquisition equipment. These data are provided to the IPCS computers to screen data for data validity and quality, perform meteorological calculations, update the data archive, display the information on the man-machine interface, and output the data to communication devices. The IPCS provides redundant computers that provide a main (Master) and backup (Slave) capability. The redundant computers in conjunction with the two trains of data acquisition provide two independent paths of data. The IPCS system monitors available error signals to determine equipment status. If an instrument input malfunctions, if data are suspect, or an instrument input is manually removed from service, the IPCS will substitute the reading from the next level of redundancy as listed in Table 2.3-290 and indicate the substitution on the IPCS computers. In the event that a data path to IPCS is unavailable, a digital recorder is available on each train of instrumentation at the meteorological instrument building to archive the raw data. Meteorological data are generally reviewed each day by personnel to identify possible data problems. The meteorological data are also validated to ensure that the amount of data retained in the master record meets the regulatory requirements for minimum recovery rates as outlined in Regulatory Guide 1.23. During the validation process the following steps are followed:

- Utilize software to review raw data
- Identify and edit questionable or invalid data
- Recover data from backup sources
- Adjust data to reflect calibration sources

After the validation process is completed, the processed data are archived and permanently stored electronically.

The objective for the meteorological monitoring program is to maintain annual data recovery rates of at least 90 percent on an annual basis for all meteorological parameters in order to assess the relative concentrations and doses resulting from accidental or routine releases. Table 2.3-291 provides recovery rates for the meteorological parameters monitored on the onsite meteorological tower. The recovery rates for each parameter, including the joint data recovery of wind speed, wind direction~~, and ΔT,~~ exceed the 90 percent guidance criteria in accordance with Regulatory Guide 1.23. ~~In addition,~~ the onsite meteorological data are considered adequate to represent onsite meteorological conditions as required by 10 CFR 100.10 and 10 CFR 100.20, as well as to make estimates of atmospheric dispersion for design basis accident and routine releases from the reactor.

Therefore,

Insert 2 here

Meteorological data are available in five different formats: instantaneous values, 1-minute blocked averages, 15-minute rolling averages, 15-minute blocked averages, and 1-hour blocked averages. Routine data summaries are generated for each day, calendar month, and calendar year and then archived on the IPCS computers. In addition, joint frequency distributions of wind speed and wind direction for each Pasquill stability category are created from the 1-hour blocked averages. The format of the annual onsite meteorological data summaries and joint frequency distribution tables conforms to the recommended format found in Regulatory Guide 1.23.

2.3.3.2 Fermi 3 Site Preparation and Construction, Pre-Operational, and Operational Onsite Meteorological Monitoring Program

As described in Section 2.3.3 of NUREG-0800, the current meteorological program establishes a baseline for identifying and assessing the environmental impacts during preapplication meteorological monitoring. The NDCT for Fermi 3 will be built in the approximate location of the current onsite meteorological tower. A new meteorological tower will be erected in the southeast corner of the Fermi site. **[START COM FSAR-2.3-003]**.The new meteorological tower will be operational for at least one year prior to the decommissioning of the existing onsite meteorological tower. The meteorological data recorded concurrently from the current and new onsite meteorological towers will

Insert 2

The meteorological tower is located east of a grove of trees that is located less than ten times the obstruction height recommended in Regulatory Guide 1.2 3. The impact of the trees, for upwind sectors, is to reduce the indicated wind speed at the 10 meter elevation. Very little impact to the wind speed has been observed at the 60 meter elevation. The SACTI analysis (Section 2.3.2) uses the data from the 60 meter elevation and, thus, is not impacted by the presence of the trees. For determination of the atmospheric dispersion factors used in the analysis of off-site design basis accident (PAVAN) and routine releases (XOQDOQ) using the lower indicated wind speed provides conservative results. For determination of control room atmospheric dispersion factors (ARCON96), the analyses were run using both the current data and data from 1985 through 1989. X/Q results from ARCON96 using both sets of data are bounded by the D CD limiting values in DCD Table 2.0-1.

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.

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.

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.

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 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.~~

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.

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.

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 replaced with signal conditioning equipment that has accuracies that are equal to 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. 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.

2.3.3.2.3 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 program. Subsection 2.3.3.1.3 provides a description of the instrument calibrations program, while Subsection 2.3.3.1.4 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.

2.3.3.2.4 Data Reduction, Transmission, Acquisition, and Processing

The method of data reduction, transmission, acquisition, and processing that is described in Subsection 2.3.3.1.5 and Subsection 2.3.3.1.6 for the pre-application monitoring program will be used for the site preparation and construction, pre-operational, and operational monitoring programs.

EF3 COL 2.0-10-A

2.3.4 Short-Term (Accident) Diffusion Estimates

The consequence of a design basis accident in terms of personnel exposure is a function of the atmospheric dispersion conditions at the site of the potential release. Atmospheric diffusion conditions are represented by relative air concentration (X/Q) values. This section describes the development of the short-term diffusion estimates for the exclusion area and low population zone boundaries and the control room.

Markup of Detroit Edison ER
(following 5 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 ER. 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.

The existing Fermi onsite meteorological tower complies with Regulatory Guide 1.23, Revision 0, February 1972.

Except as described in Section 6.4.1.1 regarding the proximity of trees to the meteorological tower,

6.4 Meteorological Monitoring

The current Fermi onsite meteorological monitoring program has been in place since it was implemented for Fermi 2 pre-operational meteorological assessment beginning in June 1975. ~~Starting in June 1975,~~ the onsite meteorological monitoring program ~~has met the requirements of~~ the proposed Revision 1 to Regulatory Guide 1.23 (September 1980). Since June 1975, some of the meteorological monitoring program components have been upgraded (**Reference 6.4-1**). Subsection 6.4.1 describes the current state of the onsite meteorological measurement program. The Fermi 2 meteorological monitoring program provides the basis for the Fermi 3 preapplication meteorological monitoring program. In addition, data from the onsite meteorological tower is used as the sole input for models that describe the short- and long-term atmospheric transport and diffusion characteristics of the site, as provided for in NRC Regulatory Guides 1.145 and 1.111, respectively. A description of the model used to analyze the short- and long-term atmospheric transport and diffusion conditions of the site is described in Subsection 2.7.6.1 and Subsection 2.7.6.2.

complies with

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 as displayed in Figure 2.1-4. Subsection 6.4.2 will describe the construction, pre-operational, and operational meteorological monitoring program for Fermi 3.

The purpose of this section is to identify that the onsite meteorological measurements program and other data-collection programs used by Fermi 3 are adequate to: (1) describe local and regional atmospheric transport and diffusion characteristics within 50 mi (80 km) of the plant, (2) ensure environmental protection, and (3) provide an adequate meteorological database for evaluation of the effects of plant operation. This discussion includes an analysis of the following meteorological monitoring system elements:

- The location of the meteorological tower and instrument siting
- Meteorological parameters measured
- Meteorological sensors
- Instrument surveillance
- System accuracy
- Data recording and transmission
- Data acquisition and reduction
- Data validation and screening
- Data display and archiving
- Data recovery rate and annual and joint frequency distribution of data

6.4.1 Fermi 3 Preapplication Meteorological Monitoring Program

6.4.1.1 Tower and Instrument Siting

Figures showing the location of the onsite meteorological tower in respect to offsite meteorological stations and surrounding topography are provided in Figure 2.7-1 and Figure 2.7-56 through Figure 2.7-59, respectively. Figure 2.1-4 provides the location of the Fermi site structures in relation to the current onsite meteorological tower. The existing onsite meteorological open-latticed tower is located approximately 1113 feet west-southwest of the Fermi 3 reactor containment building and has a height of 197 feet above plant grade. This location is within a distance that is less than 10 times the height of the Fermi 3 reactor building, and therefore does not fully meet the siting criteria of NRC Regulatory Guide 1.23. Accordingly, a new meteorological tower will be built prior to construction of Fermi 3. Subsection 6.4.1.1 describes the location of the new meteorological tower. The meteorological parameters specified in NRC Regulatory Guide 1.23 are measured by instrumentation mounted at two levels (10-m (33-ft) and 60-m (197-ft)) on the tower. The 10-m and 60-m elevations were selected to approximate the heights of release of activity emanating from ground level and the plant's heat dissipation system, respectively. The meteorological sensors are mounted on booms~~, which are greater than one tower width away from the tower and are oriented normal to the prevailing wind direction.~~ The meteorological sensor types, heights, and location in reference to structures are in conformance with NRC Regulatory Guide 1.23.

to minimize any impact to downwind measurements.

, Revision 0, February 1972

The influence of terrain near the base of the tower on temperature measurements is minimal. The tower is situated in a relatively flat area. A small climate-controlled instrument shelter is located at the base of the tower. The tower is situated in an area east of a grove of trees that is located less than ten times the obstruction height recommended in Regulatory Guide 1.23. ~~However, based on analysis of historic wind data collected from the meteorological tower it has been determined that the trees do not impact the wind measurements.~~ The tower is located sufficiently close to the shoreline of Lake Erie such that it can measure the dynamic onshore flow conditions that could affect gaseous effluent releases. This effect on the dispersion conditions is representative of the site because the facility itself is located along the western shoreline of Lake Erie.

Potential impact of the trees on the analysis is described in Subsection 6.4.1.6.

6.4.1.2 Instrumentation and Their Accuracies and Thresholds

Meteorological Sensors

The instrumentation on the meteorological tower consists 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 vertical air temperature difference system (ΔT), and a 10-m dewpoint temperature sensor. In addition, a heated tipping bucket rain gauge monitors precipitation at ground level at the base of the meteorological tower. Table 6.4-1 provides a listing of the meteorological parameters monitored on the tower, the sampling height(s), as well as the sensing technique for the primary and secondary systems.

To minimize data loss due to ice storms, external heaters are installed on the primary wind sensors. The heaters are thermostatically controlled and are of the slip-on/slip-off design for easy attachment. The wind sensor specifications are not affected by these heaters. A windscreen is

The length of the boom complies with Revision 0 of Regulatory Guide 1.23; however, it does not comply with Regulatory Guide 1.23, Revision 1, March 2007, in that the length is less than twice the longest horizontal dimension. As described in Section 2.7.6, up to twelve years of meteorological data were used in the calculation of atmospheric dispersion estimates. This extensive data set provides assurance that the meteorological data used in the calculations accurately characterize the site, and that the calculated atmospheric dispersion estimates are appropriately conservative.

The accuracy of the differential temperature channel does not comply with Regulatory Guide 1.23, Revision 1, March 2007. Revision 1 of Regulatory Guide 1.23 was issued during the final year of data collection to support the Fermi 3 COL application. The majority of the meteorological data, obtained from several years prior to 2007, were consistent with the regulatory guidance in effect at the time. As discussed in Section 2.7.6, up to twelve years of meteorological data were used in the calculation of atmospheric dispersion estimates. The tower is an open lattice construction. The open areas in between the support frames of the tower minimizes the area of impact to the sensors. The extensive data set and the open lattice design provides assurance that the meteorological data use din the calculations accurately characterize the site, and that the calculated atmospheric dispersion estimates are appropriately conservative.

mounted around the precipitation gage to minimize the amount of windblown snow and debris deposited in the gage.

The accuracies and thresholds for the meteorological sensors located on the meteorological tower are presented in Table 6.4-2. The accuracies and thresholds for each sensor are within the limitations specified in the proposed Revision 1 to Regulatory Guide 1.23 (September 1980).

Data Recording Equipment

After the data are collected by the sensors, the output is routed through signal conditioning equipment and then directed to digital data recorders. ~~The signal conditioning equipment and~~ digital recorders are located at the base of the tower in the instrument shelter. An analog backup recorder also records the output from the sensors in the event that the primary digital recorder fails.

The digital recorders sample the data at least once very five seconds.

The accuracies for the primary and secondary recording devices are presented in Table 6.4-2.

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

6.4.1.3 Instrument Calibration

The sensors, electronics, and recording equipment are calibrated on a six month basis. More frequent onsite calibrations are performed if the past operating history of the sensor indicates it is necessary. Any necessary adjustments are made onsite and the equipment that malfunctioned is either corrected onsite or replaced with similar spare equipment. After any adjustments or repairs, the calibration is repeated. Electronics calibrations are performed by simulating the output of each of the sensors with precision test equipment and monitoring the recorded values for each parameter. The resistance response to specified temperatures for the temperature thermistors is performed in the laboratory using calibrated measurement equipment. The calibrated temperature thermistor is then used to replace the existing sensor installed on the meteorological tower. The response of the calibrated temperature thermistor is then compared to an ambient temperature measurement taken at the sensor with a calibrated thermometer.

The dew point sensor is calibrated by comparing the result reported by the dew point sensor against the dew point measured by a calibrated, portable dew point hygrometer at the aspirator inlet.

The precipitation sensor is calibrated by comparing the result reported by the precipitation sensor to a known volume of liquid.

The calibration of the wind speed sensors is performed in a wind tunnel by an outside vendor using calibrated measurement equipment and a NIST Traceable Wind Tunnel Anemometer. In the wind

Examination of the 2003-2007 meteorological data indicates that there is variability in the wind direction measurements during periods when wind speed is less than 1 mph, providing reasonable assurance that the starting threshold for the wind direction sensors is equal to or less than 1 mph.

tunnel the wind velocity is calibrated at specific points and the starting threshold is determined. The calibrated wind speed sensor is then used to replace the existing sensor installed on the meteorological tower.

The calibration of the wind direction sensor is performed by an outside vendor using calibrated measurement equipment. The calibration does not include a specific test of the starting threshold for wind direction. The starting threshold of the calibrated wind direction sensor is assessed at the time of installation by rotating the wind direction sensor body with the shaft in the horizontal plane and observing that the vane remains stationary. A new bearing is installed in the wind direction sensor if required. After installation of the new wind direction sensor, the directional alignment of the wind direction sensor is checked by sighting a known alignment point and comparing the result reported by the wind direction sensor to a known response.

The records documenting results of calibrations, drift from calibrations, and corrective action taken for the digital instrumentation are kept and filed onsite.

6.4.1.4 **Instrument Service and Maintenance**

periodically

Visits are made ~~twice a week~~ to the tower to make a visual inspection of the sensors, as well as the data output and recording equipment in the instrument shelter, to see if they are damaged and need maintenance. In the event the sensors or monitoring equipment is found damaged or malfunctioning, the equipment is replaced or corrected in a timely fashion. A stock of spare parts and equipment is maintained to minimize and shorten the periods of outages. Using the same precision test equipment used for calibration, the instrumentation is checked to ensure reliable operation. Records documenting results of major causes of instrument sensor outages and other malfunctions of the meteorological monitoring system are kept and filed onsite. A similar inspection and maintenance program is in place for the computers and equipment located in the control room.

6.4.1.5 **Data Reduction and Transmission**

application

The pre-~~operational~~ meteorological monitoring program is composed of two independent meteorological trains of instrumentation – a primary train and a secondary train – mounted on the tower. Both trains feed the data acquisition equipment of the Integrated Plant Computer System (IPCS) located in the Fermi 2 Control Room. The IPCS has the capability to share the meteorological data with other plant computers, display the data on IPCS terminals at various plant locations, and perform plume dispersion analysis in support of Emergency Plan activities. Users can simultaneously access the meteorological data through two available dial-up lines located at the instrument shelter. The NRC can also receive selected meteorological data through the Emergency Response Data System (ERDS) interface on IPCS. The operational meteorological monitoring system is described in further detail in the following subsections and is illustrated in Figure 6.4-1.

Signal Conditioning and Data Reduction

Inside the instrument shelter, sensor signals are conditioned. Each sensor signal requires a single printed-circuit board to perform the necessary conversion, amplification, and scaling to provide a

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.

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

Attachment 9
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4881 Revision 2)

RAI Question No. 02.03.04-5

NRC RAI 02.03.04-5

This question is related to the applicant's supplemental responses to RAIs 02.03.03-1, 02.03.04-3, and 02.03.04-4 submitted in Detroit Edison letter NRC3-10-0015, dated March 30, 2010.

Question Summary:
Discrepancies in wind speed and stability class frequency distributions (discussed below) create uncertainty as to which meteorological data set (1985-1989 versus 2002-2007) is most representative of site conditions. Given the uncertainty in the data, please justify why both sets of control room (CR) and technical support center (TSC) atmospheric dispersion (χ/Q) values should not be presented in FSAR Section 2.3.4.3 and the more conservative resulting χ/Q values be presented in FSAR Table 2.0-201 as Fermi 3 site characteristic values.

Details:
As described in the supplemental response to RAI 02.03.04-3, the applicant reviewed the 2001-2007 data from the Fermi meteorological tower and found a number of hourly measurements to be improbable. The applicant removed these hourly measurements from its analysis and used the revised 2001-2007 database to update its CR and TSC atmospheric dispersion factors.
The supplemental response to RAI 02.03.03-1 states that after a review of wind rose data spanning a period of over 30 years, the applicant concluded that the potential exists for recent wind speed measurements at the 10-meter elevation to be slower than the actual wind speeds due to trees located in the vicinity of the Fermi meteorological tower. The applicant further concluded that because the diffusion coefficients in the ARCON96 atmospheric dispersion model are a function of a low wind speed correction and a building wake correction, the limiting ARCON96 χ/Q values may not occur at the lowest wind speeds. Consequently, the applicant also generated CR and TSC χ/Q values using available data from 1985-1989. The applicant stated that aerial photographs of the area surrounding the Fermi meteorological tower during this time period confirm the absence of significant air flow obstructions to wind measurements at the 10 meter elevation. The applicant concludes the CR and TSC χ/Q values from both sets of date (the 1985-1989 and the revised 2001-2007) are bounded by the corresponding ESBWR site parameter values presented in DCD Tier 2 Table 2.0-201.

The applicant provided a copy of the 1985-1989 data from the Fermi meteorological tower in its supplemental response to RAI 02.03.03-1. The staff compared these data against the 2001-2007 dataset and found the older dataset had lower frequencies of (1) low wind speed conditions at the 10-meter elevation and (2) extremely unstable (stability class A) conditions.

Response

The input parameters used to determine the on-site X/Q values are taken from the ESBWR DCD Appendix 2A. Per GEH Letter MFN 10-193 "Transmittal of Changes to ESBWR DCD Tier 2, Chapter 2, Appendix 2A," dated July 9, 2010 (ML101930237), the input parameters specified in DCD Appendix 2 A were revised and the changes identified on the accompanying markups will be incorporated into DCD Revision 8.

To maintain continuity with the GEH changes to the DCD, the ARCON96 models for Fermi 3 were updated with the revised inputs shown in the markups included in GEH Letter MFN 10-

193. The updated ARCON96 results for both the 1985-1989 and 2001-2007 meteorological data sets are included in the attached markups for FSAR Section 2.3.4. Also included is an update to FSAR Table 2.0-201 to include the more conservative results as the Fermi 3 site characteristic values.

Included in Enclosure 1 with this response are the ARCON96 input and output files for both the 1985-1989 and 2001-2007 meteorological data sets.

Proposed COLA Revision

Attached are markups for FSAR Table 201-201 and Section 2.3.4 to reflect the updated ARCON96 results.

Markup of Detroit Edison COLA
(following 25 pages)

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.

Add the following to all of the Evaluation statements for the on-site X/Qs:
"and Table 2.3-XXX"

Subject [16]	DCD Site Parameter Value [1][16]	Fermi 3 Site Characteristic	
Meteorological Dispersion (X/Q) (continued)			
4–30 days	3.00E-05 s/m^3	~~3.13E-06~~ s/m^3 3.22E-06	The site characteristic value for short-term (accident release) atmospheric dispersion for 4–30 day X/Q value at the LPZ is defined as the 4–30 day atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ. The site characteristic value falls within (is lower than) the DCD site parameter value.
Control Room X/Q *[17] * First value is for unfiltered inleakage. Second value is for air intakes (emergency and normal). Reactor Building Unfiltered inleakage			Control Room X/Q values shown on the same row in DCD Table 2.0-1 are in sets below: first a set for unfiltered inleakage, followed by a set for air intakes (emergency and normal).
0–2 hours	1.90E-03 s/m^3	~~1.09E-03~~ s/m^3 1.7E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value
2–8 hours	1.30E-03 s/m^3	~~1.10E-03~~ s/m^3 1.1E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	5.90E-04 s/m^3	~~4.56E-04~~ s/m^3 4.3E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	5.00E-04 s/m^3	~~3.57E-04~~ s/m^3 3.3E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	4.40E-04 s/m^3	~~2.70E-04~~ s/m^3 2.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Air intakes (maximum of emergency and normal)			
0–2 hours	1.50E-03 s/m^3	~~1.22E-03~~ s/m^3 1.1E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	1.10E-03 s/m^3	~~8.93E-04~~ s/m^3 7.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject (16)	DCD Site Parameter Value(1)(16)	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Control Room X/Q(17) (continued)			
Reactor Building – (continued)			
Air intakes (maximum of emergency and normal) (continued)			
8–24 hours	5.00E-04 s/m^3	~~3.46E-04~~ s/m^3 3.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	4.20E-04 s/m^3	~~2.75E-04~~ s/m^3 2.4E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	3.80E-04 s/m^3	~~2.20E-04~~ s/m^3 1.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Passive Containment Cooling System/Reactor Building Roof			
Unfiltered inleakage			
0–2 hours	3.40E-03 s/m^3	~~1.83E-03~~ s/m^3 1.7E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	2.70E-03 s/m^3	~~1.29E-03~~ s/m^3 1.2E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.40E-03 s/m^3	~~4.40E-04~~ s/m^3 4.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	1.10E-03 s/m^3	~~3.11E-04~~ s/m^3 2.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	7.90E-04 s/m^3	~~2.08E-04~~ s/m^3 2.2E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Air intakes (maximum of emergency and normal)			
0–2 hours	3.00E-03 s/m^3	~~1.45E-03~~ s/m^3 1.4E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject (16)	DCD Site Parameter Value(1)(16)	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Control Room X/Q(17) (continued)			
Passive Containment Cooling System/Reactor Building Roof (continued)			
Air intakes (maximum of emergency and normal) (continued)			
2–8 hours	2.50E-03 s/m^3	~~1.14E-03~~ s/m^3 1.0E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.20E-03 s/m^3	~~4.00E-04~~ s/m^3 3.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	9.00E-04 s/m^3	~~3.11E-04~~ s/m^3 2.7E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	7.00E-04 s/m^3	~~2.94E-04~~ s/m^3 2.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Blowout Panels/Reactor Building Roof			
Unfiltered inleakage			
0–2 hours	7.00E-03 s/m^3	~~2.37E-03~~ s/m^3 4.6E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	5.00E-03 s/m^3	~~1.89E-03~~ s/m^3 3.9E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 days	2.10E-03 s/m^3	~~7.13E-04~~ s/m^3 1.6E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	1.70E-03 s/m^3	~~6.54E-04~~ s/m^3 1.3E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	1.50E-03 s/m^3	~~5.07E-04~~ s/m^3 1.1E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject [16]	DCD Site Parameter Value[1][16]	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Control Room X/Q[17] (continued)			
Blowout Panels/Reactor Building Roof (continued)			
Air intakes (maximum of emergency and normal)			
0–2 hours	5.90E-03 s/m^3	~~2.27E-03~~ s/m^3 3.7E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	4.70E-03 s/m^3	~~1.77E-03~~ s/m^3 3.0E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 days	1.50E-03 s/m^3	~~6.30E-04~~ s/m^3 1.2E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	1.10E-03 s/m^3	~~5.47E-04~~ s/m^3 9.1E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-03 s/m^3	~~5.48E-04~~ s/m^3 7.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Turbine Building			
Unfiltered inleakage			
0–2 hours	1.20E-03 s/m^3	~~5.00E-04~~ s/m^3 6.4E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	9.80E-04 s/m^3	~~3.27E-04~~ s/m^3 3.8E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	3.90E-04 s/m^3	~~1.35E-04~~ s/m^3 1.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	3.80E-04 s/m^3	~~9.62E-05~~ s/m^3 1.1E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	3.20E-04 s/m^3	~~8.34E-05~~ s/m^3 8.5E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject [16]	DCD Site Parameter Value [1][16]	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Control Room X/Q [17] (continued)			
Turbine Building (continued)			
Air intakes (maximum of emergency and normal)			
0–2 hours	1.20E-03 s/m^3	~~7.43E-04~~ s/m^3 6.8E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	9.80E-04 s/m^3	~~4.05E-04~~ s/m^3 4.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	3.90E-04 s/m^3	~~1.65E-04~~ s/m^3 1.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	3.80E-04 s/m^3	~~1.10E-04~~ s/m^3 1.2E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	3.20E-04 s/m^3	~~9.87E-05~~ s/m3 9.1E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Fuel Building			
Unfiltered inleakage			
0–2 hours	2.80E-03 s/m^3	~~2.70E-03~~ s/m^3 2.2E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value
2–8 hours	2.50E-03 s/m^3	~~2.20E-03~~ s/m^3 1.6E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.25E-03 s/m^3	~~9.11E-04~~ s/m^3 6.4E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject [16]	DCD Site Parameter Value [1][16]	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Control Room X/Q (continued)			
Fuel Building (continued)			
Unfiltered inleakage (continued)			
1–4 days	1.10E-03 s/m^3	~~8.20E-04~~ s/m^3 5.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-03 s/m^3	~~7.18E-04~~ s/m^3 4.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Air intakes (maximum of normal and emergency)			
0–2 hours	2.80E-03 s/m^3	~~2.23E-03~~ s/m^3 2.0E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value
2–8 hours	2.50E-03 s/m^3	~~1.88E-03~~ s/m^3 1.6E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.25E-03 s/m^3	~~7.48E-04~~ s/m^3 6.2E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	1.10E-03 s/m^3	~~6.22E-04~~ s/m^3 4.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-03 s/m^3	~~5.59E-04~~ s/m^3 4.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Radwaste Building Unfiltered inleakage			
			The PCCS vent X/Q values are assumed to bound the X/Q values for any release from the RW Building based on distance and direction to the CR receptors, and the PCCS vent X/Q values are used to evaluate releases from the RW Building in the DCD (Section 15.3.16). The PCCS X/Q values are compared to the RW Building X/Q results.
0–2 hours	3.40E-03 s/m^3	~~1.83E-03~~ s/m^3 1.7E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject [16]	DCD Site Parameter Value[1][16]	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Control Room X/Q (continued) Radwaste Building (continued) Unfiltered inleakage (continued)			
2–8 hours	2.70E-03 s/m^3	~~1.20E-03~~ s/m^3 1.2E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.40E-03 s/m^3	~~4.48E-04~~ s/m^3 4.5E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	1.10E-03 s/m^3	~~3.11E-04~~ s/m^3 2.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	7.90E-04 s/m^3	~~2.68E-04~~ s/m^3 2.2E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Air Intakes (maximum of normal and emergency)			
0–2 hours	3.00E-03 s/m^3	~~1.45E-03~~ s/m^3 1.4E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	2.50E-03 s/m^3	~~1.14E-03~~ s/m^3 1.0E-03	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.20E-04 s/m^3	~~4.06E-04~~ s/m^3 3.9E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	9.00E-04 s/m^3	~~3.11E-04~~ s/m^3 2.7E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	7.00E-04 s/m^3	~~2.04E-04~~ s/m^3 2.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject [16]	DCD Site Parameter Value[(1)(16)]	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Reactor Building[(17)]			
TSC Unfiltered Inleakage and TSC Air Intakes (emergency and normal)			
0–2 hours	1.00E-03 s/m^3	~~2.73E-04~~ s/m^3 2.4E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	6.00E-04 s/m^3	~~2.28E-04~~ s/m^3 2.0E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	3.00E-04 s/m^3	~~9.48E-05~~ s/m^3 8.2E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	2.00E-04 s/m^3	~~8.06E-05~~ s/m^3 6.8E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-04 s/m^3	~~6.78E-05~~ s/m^3 5.8E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Turbine Building[(17)]			
TSC Unfiltered Inleakage and TSC Air Intakes (emergency and normal)			
0–2 hours	2.00E-03 s/m^3	~~1.65E-03~~ s/m^3 6.6E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	1.50E-03 s/m^3	~~1.09E-03~~ s/m^3 4.2E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	8.00E-04 s/m^3	~~4.35E-04~~ s/m^3 1.7E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	6.00E-04 s/m^3	~~3.84E-04~~ s/m^3 1.4E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	5.00E-04 s/m^3	~~3.40E-04~~ s/m^3 1.2E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

Subject (16)	DCD Site Parameter Value(1)(16)	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
Passive Containment Cooling System/Reactor Building Roof(17)			
TSC Unfiltered Inleakage and TSC Air Intakes (emergency and normal)			
0–2 hours	2.00E-03 s/m^3	~~4.65E-04~~ s/m^3 3.6E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
2–8 hours	1.10E-03 s/m^3	~~3.50E-04~~ s/m^3 2.8E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
8–24 hours	5.00E-04 s/m^3	~~1.40E-04~~ s/m^3 1.1E-04	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
1–4 days	4.00E-04 s/m^3	~~1.10E-04~~ s/m^3 9.3E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
4–30 days	3.00E-04 s/m^3	~~1.00E-04~~ s/m^3 7.3E-05	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.
Long Term Dispersion Estimates(12)			
X/Q RB/FB Vent Stack TB Vent Stack RWB Vent Stack	3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	The site characteristic values for long term (routine release) atmospheric dispersion estimates are based on the maximally exposed individual (MEI) for each pathway.	The site characteristic values for long term (routine release) atmospheric dispersion estimates are defined based on type of sensitive receptor (MEI) and decay time. Each of these values is compared with the appropriate DCD site parameter value, X/Q or D/Q, below. Each site characteristic value that is equal to or less than the DCD site parameter value results in a lower estimated dose for the same source term, and conversely, a higher X/Q or D/Q results in a higher estimated dose.

wake credit. The building height entered was also zero to conservatively neglect the building wake credit.

The tower height is the height at which the wind speed was measured. Based on the lower measurement location, the tower height used was 10 m.

As described in Regulatory Guide 1.145, a ground-level release includes all release points that are effectively lower than two and one-half times the height of adjacent solid structures. Therefore, as stated above, a ground-level release was assumed.

Table 2.3-300 provides the offsite atmospheric dispersion factors. The PAVAN modeling results for the maximum sector X/Q values at the Dose Calculation EAB and the Dose Calculation LPZ relative to the 0-2-hour time period, ~~the annual average time period,~~ and other intermediate time intervals evaluated by the PAVAN model are presented as follows:

Fermi 3 Maximum X/Q Values (sec/m^3)

	0-2 hours	0-8 hours	8-24 hours	1-4 days	4-30 days
Dose Calculation EAB	~~3.66E-04~~ 3.95E-04				
Dose Calculation LPZ	N/A	~~3.23E-05~~ 3.46E-05	~~2.23E-05~~ 2.37E-05	~~9.95E-06~~ 1.05E-05	~~3.13E-06~~ 3.22E-06

2.3.4.3 Atmospheric Dispersion Factors for On-Site Doses

Onsite X/Q values for use in evaluating potential doses from Fermi 3 postulated release locations (sources) to on-site receptor locations are based on the Fermi 3 layout shown in DCD Figure 2A-1. The values were determined based on hourly meteorological data from the years 2001 through 2007 [and 1985 through 1989]. The X/Q values for the control room and technical support center were calculated using the ARCON96 computer code in accodance with guidance as documented in RG 1.194. ~~The source and receptor combinations are shown in Table 2.3-303.~~ [and Table 2.3-XXX] DCD Figure 2A-1 shows the locations of postulated accidental releases from Fermi 3 and the Fermi 3 receptor locations. Results from the ARCON96 computer code for each of the source and receoptor combinations are provided in Table ~~2.3-303.~~

The meteorological tower is located east of a grove of trees that is located less than ten times the obstruction height recommended in Regulatory Guide 1.23. The impact of the trees, for upwind sectors, is to reduce the indicated wind speed at the 10 meter elevation. On-site atmospheric dispersion factors were determined based on meteorological data from 2001 through 2007 and 1985 through 1989. Both time periods were used in the analysis to consider potential impacts from the trees. X/Q results from ARCON96 using both sets of data are bounded by the DCD limiting values in DCD Table 2.0-1.

The dose consequences to operators at other units must be determined in addition to the unit with the accident. The intent is to ensure that an accident in the adjacent unit will not prevent the safe shutdown of the "other" unit. As such, dispersion factors are required so that these doses may be calculated. The cross-unit X/Q values are conservatively based on a simple point source model. A distance of 350 m (1150 ft) between

Table 2.3-303 Onsite X/Q Factors from ARCON96 Runs (Sheet 1 of 4) [EF3 COL 2.0-10-A]

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Reactor Building	Control Building Louvers	1.69E-03	1.19E-03	4.56E-04	3.57E-04	2.70E-04
Reactor Building	Emergency Intake North	1.14E-03	8.63E-04	3.34E-04	2.75E-04	2.20E-04
Reactor Building	Emergency Intake South	1.12E-03	8.28E-04	3.21E-04	2.41E-04	1.83E-04
Reactor Building	Normal Air Intake	1.22E-03	8.93E-04	3.46E-04	2.56E-04	1.92E-04
Reactor Building	TSC Intake East	2.44E-04	2.00E-04	8.44E-05	7.37E-05	6.19E-05
Reactor Building	TSC Intake West	2.73E-04	2.28E-04	9.48E-05	8.06E-05	6.78E-05
PCCS	Control Building Louvers	1.83E-03	1.29E-03	4.48E-04	3.11E-04	2.68E-04
PCCS	Emergency Intake North	1.45E-03	[illegible]	4.06E-04	3.11E-04	2.94E-04
PCCS	Emergency Intake South	1.17E-03	8.67E-04	2.95E-04	2.14E-04	1.86E-04
PCCS	Normal Air Intake	1.18E-03	8.59E-04	2.95E-04	2.08E-04	1.78E-04
PCCS	TSC Intake East	3.88E-04	2.97E-04	1.13E-04	1.02E-04	8.55E-05
PCCS	TSC Intake West	4.65E-04	3.58E-04	1.40E-04	1.19E-04	1.00E-04
Turbine Building	Control Building Louvers	5.99E-04	3.27E-04	1.35E-04	9.62E-05	8.34E-05
Turbine Building	Emergency Intake North	7.43E-04	4.05E-04	1.65E-04	1.18E-04	9.87E-05
Turbine Building	Emergency Intake South	5.67E-04	3.23E-04	1.34E-04	9.06E-05	7.70E-05
Turbine Building	Normal Air Intake	5.28E-04	2.95E-04	1.23E-04	8.35E-05	7.16E-05

Insert Table 2.3-303

Insert Table 2.3-303 Onsite X/Q Factors from ARCON96 Runs (Sheet 1 of 4)
(Based on 2001-2007 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Reactor Building	Control Building Louvers	1.7E-03	1.1E-03	4.3E-04	3.3E-04	2.5E-04
Reactor Building	Emergency Intake North	1.1E-03	7.9E-04	3.0E-04	2.4E-04	1.9E-04
Reactor Building	Emergency Intake South	1.1E-03	7.6E-04	2.9E-04	2.2E-04	1.6E-04
Reactor Building	Normal Air Intake	1.1E-03	7.8E-04	3.0E-04	2.2E-04	1.7E-04
Reactor Building	TSC Intake B	2.3E-04	1.9E-04	7.8E-05	6.6E-05	5.6E-05
Reactor Building	TSC Intake A	2.4E-04	2.0E-04	8.2E-05	6.8E-05	5.8E-05
PCCS	Control Building Louvers	1.7E-03	1.2E-03	4.0E-04	2.8E-04	2.0E-04
PCCS	Emergency Intake North	1.4E-03	9.9E-04	3.6E-04	2.6E-04	2.0E-04
PCCS	Emergency Intake South	1.1E-03	7.7E-04	2.7E-04	1.9E-04	1.4E-04
PCCS	Normal Air Intake	1.1E-03	7.8E-04	2.6E-04	1.9E-04	1.4E-04
PCCS	TSC Intake B	3.4E-04	2.6E-04	9.9E-05	8.4E-05	6.9E-05
PCCS	TSC Intake A	3.6E-04	2.7E-04	1.0E-04	8.8E-05	7.3E-05
Turbine Building	Control Building Louvers	6.4E-04	3.8E-04	1.5E-04	1.1E-04	8.5E-05
Turbine Building	Emergency Intake North	6.8E-04	4.0E-04	1.5E-04	1.2E-04	9.1E-05
Turbine Building	Emergency Intake South	5.4E-04	3.3E-04	1.3E-04	9.5E-05	7.5E-05

Insert Table 2.3-303 Onsite X/Q Factors from ARCON96 Runs (Sheet 2 of 4)
(Based on 2001-2007 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Turbine Building	Normal Air Intake	5.2E-04	3.2E-04	1.3E-04	9.1E-05	7.2E-05
Turbine Building	TSC Intake B	6.6E-04	4.2E-04	1.7E-04	1.4E-04	1.2E-04
Turbine Building	TSC Intake A	6.2E-04	4.2E-04	1.7E-04	1.4E-04	1.2E-04
TB-TD	Control Building Louvers	2.5E-04	1.8E-04	6.6E-05	4.5E-05	3.2E-05
TB-TD	Emergency Intake North	2.4E-04	1.8E-04	6.3E-05	4.2E-05	3.1E-05
TB-TD	TSC Intake B	5.7E-04	4.4E-04	1.9E-04	1.2E-04	1.0E-04
Fuel Building	Control Building Louvers	2.2E-03	1.6E-03	6.4E-04	5.5E-04	4.5E-04
Fuel Building	Emergency Intake North	1.1E-03	9.1E-04	3.6E-04	3.1E-04	2.6E-04
Fuel Building	Emergency Intake South	1.5E-03	1.3E-03	5.0E-04	4.0E-04	3.4E-04
Fuel Building	Normal Air Intake	2.0E-03	1.6E-03	6.1E-04	4.8E-04	4.0E-04
Radwaste Building	Normal Air Intake	4.5E-04	3.5E-04	1.4E-04	9.0E-05	6.7E-05
Reactor Building Vent Stack	Control Building Louvers	9.3E-04	6.9E-04	2.5E-04	2.1E-04	1.7E-04
Reactor Building Vent Stack	Emergency Intake South	6.8E-04	5.1E-04	1.8E-04	1.5E-04	1.2E-04
Reactor Building Vent Stack	Normal Air Intake	7.4E-04	5.5E-04	2.0E-04	1.6E-04	1.3E-04
Turbine Building Vent Stack	Control Building Louvers	3.1E-04	2.1E-04	7.5E-05	5.5E-05	3.8E-05

Insert Table 2.3-303 Onsite X/Q Factors from ARCON96 Runs (Sheet 3 of 4)
(Based on 2001-2007 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Turbine Building Vent Stack	Emergency Intake North	3.3E-04	2.2E-04	7.4E-05	5.3E-05	3.7E-05
Turbine Building Vent Stack	Normal Air Intake	2.6E-04	1.7E-04	5.9E-05	4.3E-05	3.0E-05
Radwaste Building Vent Stack	Control Building Louvers	6.1E-04	4.8E-04	1.8E-04	1.2E-04	9.0E-05
Radwaste Building Vent Stack	Emergency Intake North	4.7E-04	3.8E-04	1.4E-04	9.8E-05	7.7E-05
Radwaste Building Vent Stack	Normal Air Intake	4.2E-04	3.3E-04	1.2E-04	8.3E-05	6.1E-05
North Reactor Building Blowout Panel	Control Building Louvers	4.2E-03	3.0E-03	1.0E-03	7.4E-04	5.4E-04
North Reactor Building Blowout Panel	Emergency Intake North	2.7E-03	2.2E-03	8.3E-04	5.9E-04	4.6E-04
North Reactor Building Blowout Panel	Emergency Intake South	2.1E-03	1.6E-03	5.5E-04	4.0E-04	2.9E-04
North Reactor Building Blowout Panel	Normal Air Intake	2.0E-03	1.5E-03	5.1E-04	3.7E-04	2.7E-04
South Reactor Building Blowout Panel	Control Building Louvers	4.4E-03	3.7E-03	1.5E-03	1.3E-03	1.1E-03

Insert Table 2.3-303 Onsite X/Q Factors from ARCON96 Runs (Sheet 4 of 4)
(Based on 2001-2007 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
South Reactor Building Blowout Panel	Emergency Intake North	2.1E-03	1.8E-03	7.2E-04	5.9E-04	5.2E-04
South Reactor Building Blowout Panel	Emergency Intake South	2.7E-03	2.3E-03	9.0E-04	6.9E-04	6.0E-04
South Reactor Building Blowout Panel	Normal Air Intake	3.3E-03	2.8E-03	1.1E-03	8.2E-04	7.0E-04
Fermi 3	Fermi 2	6.7E-05	5.5E-05	1.8E-05	1.3E-05	8.9E-06
Fermi 2	Fermi 3	7.5E-05	6.7E-05	3.0E-05	2.3E-05	2.0E-05

(Based on 2001-2007 meteorological data set)

Table 2.3-304 Cross-Unit X/Q Factors~~(1)~~ [EF3 COL 2.0-10-A]

Release-Receptor Combination	Time Period	X/Q with Safety Factor = 1.5(sec/m^3)	
Fermi 3 to Fermi 2	0-2 hours	~~9.80E-05~~	1.0E-04
	2-8 hours	~~6.59E-05~~	8.2E-05
	8-24 hours	~~2.70E-05~~	2.8E-05
	1-4 days	~~2.03E-05~~	2.0E-05
	4-30 days	~~1.55E-05~~	1.3E-05
Fermi 2 to Fermi 3	0-2 hours	~~1.23E-04~~	1.1E-04
	2-8 hours	~~1.03E-04~~	1.0E-04
	8-24 hours	~~5.03E-05~~	4.4E-05
	1-4 days	~~4.10E-05~~	3.4E-05
	4-30 days	~~3.54E-05~~	3.1E-05

~~1. **[START COM 2.3-204]** The atmospheric dispersion factors (X/Qs) calculated for the Control Room and Technical Support Center using ARCON96 are currently under revision as part of the effort described in Detroit Edison letter NRC3-10-003, dated February 8, 2010. Detroit Edison will provide the COLA revision to reflect the new atmospheric dispersion factors (X/Qs) calculated for the Control Room and Technical Support Center under separate correspondence to the NRC by March 25, 2010. **[END COM 2.3-204]**~~

Insert Table 2.3-XXX Onsite X/Q Factors from ARCON96 Runs (Sheet 1 of 4)
(Based on 1985-1989 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Reactor Building	Control Building Louvers	1.4E-03	9.9E-04	4.0E-04	3.0E-04	2.4E-04
Reactor Building	Emergency Intake North	9.8E-04	7.3E-04	2.9E-04	2.3E-04	1.7E-04
Reactor Building	Emergency Intake South	9.8E-04	6.9E-04	2.8E-04	2.0E-04	1.7E-04
Reactor Building	Normal Air Intake	1.0E-03	7.0E-04	2.9E-04	2.0E-04	1.7E-04
Reactor Building	TSC Intake B	2.4E-04	1.9E-04	7.9E-05	6.4E-05	5.1E-05
Reactor Building	TSC Intake A	2.4E-04	2.0E-04	8.2E-05	6.7E-05	5.3E-05
PCCS	Control Building Louvers	1.7E-03	1.2E-03	4.5E-04	2.9E-04	2.2E-04
PCCS	Emergency Intake North	1.3E-03	1.0E-03	3.9E-04	2.7E-04	2.0E-04
PCCS	Emergency Intake South	1.1E-03	8.1E-04	2.9E-04	2.0E-04	1.5E-04
PCCS	Normal Air Intake	1.1E-03	8.1E-04	2.9E-04	2.0E-04	1.4E-04
PCCS	TSC Intake B	3.4E-04	2.7E-04	1.1E-04	8.9E-05	7.0E-05
PCCS	TSC Intake A	3.6E-04	2.8E-04	1.1E-04	9.3E-05	7.3E-05
Turbine Building	Control Building Louvers	5.5E-04	3.6E-04	1.3E-04	1.0E-04	7.0E-05
Turbine Building	Emergency Intake North	5.6E-04	3.7E-04	1.3E-04	1.0E-04	7.5E-05
Turbine Building	Emergency Intake South	4.7E-04	3.0E-04	1.1E-04	8.5E-05	5.9E-05

Insert Table 2.3-XXX Onsite X/Q Factors from ARCON96 Runs (Sheet 2 of 4)
(Based on 1985-1989 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Turbine Building	Normal Air Intake	4.6E-04	3.0E-04	1.1E-04	8.3E-05	5.6E-05
Turbine Building	TSC Intake B	5.3E-04	3.8E-04	1.5E-04	1.2E-04	9.9E-05
Turbine Building	TSC Intake A	5.1E-04	3.6E-04	1.5E-04	1.2E-04	9.8E-05
TB-TD	Control Building Louvers	2.5E-04	2.0E-04	7.1E-05	5.0E-05	3.5E-05
TB-TD	Emergency Intake North	2.5E-04	1.9E-04	6.9E-05	4.7E-05	3.2E-05
TB-TD	TSC Intake B	6.2E-04	5.2E-04	2.1E-04	1.4E-04	1.1E-04
Fuel Building	Control Building Louvers	2.1E-03	1.6E-03	6.3E-04	5.5E-04	4.2E-04
Fuel Building	Emergency Intake North	1.2E-03	9.2E-04	3.7E-04	3.1E-04	2.4E-04
Fuel Building	Emergency Intake South	1.6E-03	1.3E-03	5.0E-04	4.1E-04	3.1E-04
Fuel Building	Normal Air Intake	2.0E-03	1.6E-03	6.2E-04	4.9E-04	3.7E-04
Radwaste Building	Normal Air Intake	4.7E-04	4.0E-04	1.5E-04	1.0E-04	7.7E-05
Reactor Building Vent Stack	Control Building Louvers	9.2E-04	7.1E-04	2.7E-04	2.2E-04	1.7E-04
Reactor Building Vent Stack	Emergency Intake South	6.7E-04	5.3E-04	2.0E-04	1.5E-04	1.2E-04
Reactor Building Vent Stack	Normal Air Intake	7.4E-04	5.8E-04	2.2E-04	1.6E-04	1.2E-04
Turbine Building Vent Stack	Control Building Louvers	3.0E-04	2.1E-04	7.6E-05	5.6E-05	3.9E-05

Insert Table 2.3-XXX Onsite X/Q Factors from ARCON96 Runs (Sheet 3 of 4)
(Based on 1985-1989 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
Turbine Building Vent Stack	Emergency Intake North	3.3E-04	2.2E-04	7.4E-05	5.7E-05	3.7E-05
Turbine Building Vent Stack	Normal Air Intake	2.5E-04	1.7E-04	6.0E-05	4.5E-05	3.1E-05
Radwaste Building Vent Stack	Control Building Louvers	6.7E-04	5.4E-04	2.0E-04	1.4E-04	1.1E-04
Radwaste Building Vent Stack	Emergency Intake North	5.3E-04	4.3E-04	1.7E-04	1.1E-04	8.9E-05
Radwaste Building Vent Stack	Normal Air Intake	4.5E-04	3.6E-04	1.3E-04	9.2E-05	7.2E-05
North Reactor Building Blowout Panel	Control Building Louvers	4.4E-03	3.2E-03	1.2E-03	8.1E-04	6.1E-04
North Reactor Building Blowout Panel	Emergency Intake North	3.1E-03	2.5E-03	1.0E-03	6.7E-04	5.3E-04
North Reactor Building Blowout Panel	Emergency Intake South	2.2E-03	1.7E-03	6.3E-04	4.4E-04	3.5E-04
North Reactor Building Blowout Panel	Normal Air Intake	2.1E-03	1.6E-03	5.7E-04	4.0E-04	3.2E-04
South Reactor Building Blowout Panel	Control Building Louvers	4.6E-03	3.9E-03	1.6E-03	1.3E-03	1.1E-03

Insert Table 2.3-XXX Onsite X/Q Factors from ARCON96 Runs (Sheet 4 of 4)
(Based on 1985-1989 Meteorological Data Set)

Release Location (Type)	Receptor Locations	0-2 hr X/Q (sec/m^3)	2-8 hr X/Q (sec/m^3)	8-24 hr X/Q (sec/m^3)	1-4 days X/Q (sec/m^3)	4-30 days X/Q (sec/m^3)
South Reactor Building Blowout Panel	Emergency Intake North	2.2E-03	1.9E-03	7.7E-04	6.2E-04	4.8E-04
South Reactor Building Blowout Panel	Emergency Intake South	3.0E-03	2.5E-03	1.0E-03	7.6E-04	5.8E-04
South Reactor Building Blowout Panel	Normal Air Intake	3.7E-03	3.0E-03	1.2E-03	9.1E-04	6.9E-04
Fermi 3	Fermi 2	6.8E-05	5.9E-05	2.0E-05	1.5E-05	1.0E-05
Fermi 2	Fermi 3	8.1E-05	7.1E-05	3.3E-05	2.5E-05	2.0E-05

Table 2.3-XXX Cross-Unit X/Q Factors (Based on 1985-1989 Meteorological Data Set)

Release-Receptor Combination	Time Period	X/Q with Safety Factor = 1.5 (sec/m^3)
Fermi 3 to Fermi 2	0-2 hours	1.0E-04
	2-8 hours	8.9E-05
	8-24 hours	3.1E-05
	1-4 days	2.3E-05
	4-30 days	1.6E-05
Fermi 2 to Fermi 3	0-2 hours	1.2E-04
	2-8 hours	1.1E-04
	8-24 hours	4.9E-05
	1-4 days	3.7E-05
	4-30 days	3.0E-05

Appendix 2A ARCON96 Source/Receptor Inputs

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

2A.2.1 **Meteorological Data**

Add the following as the last sentence of this section.

EF3COL 2A.2-1-A

Instrumentation heights used in the analysis are described in Subsection 2.3.3.1.1 Meteorological data from 2001 through 2007 is used in the analysis

2A.2.3 **ARCON96 ESBWR Inputs**

Replace the last sentence of the first paragraph with the following.

EF3COL 2A.2-1-A

These directions are adjusted by the difference in angle (approximately 19 degrees counterclockwise) between the ESBWR plant north and the Fermi 3 plant north; Fermi 3 receptor to source directions are shown in Table 2A-4R analysis.

2A.2.4 **Confirmation of the ESBWR χ/Q Values**

Replace this section with the following.

EF3COL 2A.2-1-A

303

DCD Figure 2A-1 shows the locations of the sources and receptors for ESBWR control room determinations, also used in the Fermi 3 evaluations. The dimensions of the diffuse source planes provided in DCD Table 2A-3 are determined as directed by RG 1.194, Regulatory Position 3.2.4.5, for the nearest receptor locations. ARCON96 calculations are performed for source/receptor pairs listed in DCD Table 2A-3 and Table 2A-4R using site-specific meteorological data. Results of the site-specific analysis are provided in Table 2.3-~~203~~ and Table 2.3-304.

and Tables 2.3-XXX and 2.3-XXX

~~[START COM 2.3-204] The atmospheric dispersion factors (X/Qs) calculated for the Control Room and Technical Support Center using ARCON96 are currently under revision as part of the effort described in Detroit Edison letter NRC3-10-003, dated February 8, 2010. Detroit Edison will provide the COLA revision to reflect the new atmospheric dispersion factors (X/Qs) calculated for the Control Room and Technical Support Center under separate correspondence to the NRC by March 25, 2010. [END COM 2.3-204]~~

2A.2.5 Confirmation of the Reactor Building χ/Q Values

Replace this section with the following.

or personnel air locks

During refueling, doors or personnel ~~air~~ locks on the east sides of the Reactor Building or Fuel Building could act as a point source that could result in control room χ/Q values that are higher than the ESBWR χ/Q values for ~~a~~ release in the Reactor Building. Therefore, the doors are administratively controlled ~~prior to and~~ during movement of irradiated fuel bundles. ~~The administrative controls are such that the doors and personnel air locks on the East sides of the Reactor Building or Fuel Building are promptly closed under conditions indicative of a fuel handling accident.~~

to remain closed

2A.3 COL Information

2A.2-1-A Confirmation of the ESBWR χ/Q Values

EF3 COL 2A.2-1-A This COL item is addressed in Subsection 2.3.4.3 and in Subsection 2A.2.4.

2A.2-2-A Confirmation of the Reactor Building χ/Q Values

EF3 COL 2A.2-2-A This COL item is addressed in Subsection 2A.2.5.

Table 2A-4R ARCON 96 Input-Recptor to Source Direction [EF3 COL 2A.2-1-A]

SourcelReceptor	Receptor to Source Direction {deg.}
RB to CBL	289
RB to EN	279
RB to ES	299
RB to N	303
RB to TSCB	231
RB to TSCA~~(1)~~	~~249~~ 235
PCCS to CBL	328
PCCS to EN	304
PCCS to ES	323
PCCS to N	327
PCCS to TSCB	233
PCCS to TSCA~~(1)~~	~~220~~ 236
TB to CBL	2
TB to EN	343
TB to ES	350
TB to N	355
TB to TSCB	251
TB to TSCA~~(1)~~	~~233~~ 255
TB-TDto ~~cB~~ CBL	360
TB-TDto EN	350
TB-TD to TSCB	296
FB to ~~cBL~~ CBL	247
FBto EN	253
FB to ES	267
FBtoN	271
RWtoN	323
RB-VS to ~~cBL~~ CBL	266
RB-VS to ES	280
RB-VS to N	281
TB-VS to ~~cBL~~ CBL	15
TB-VS to EN	360
TB-VS to N	7
RW-VS to ~~cBL~~ CBL	321
RW-VS to EN	309
RW-VS to N	323
BPNto ~~cBL~~ CBL	341
BPN to EN	304
BPNto ES	325

Table 2A-4R ARCON 96 Input-Recptor to Source Direction [EF3 COL 2A.2-1-A]

SourcelReceptor	Receptor to Source Direction {deg.}
BPNto N	334
BPS to CBL	238
BPS to EN	248
BPS to ES	274
BPS to N	278
Fermi 3 to Fermi 2	48
Fermi 2 to Fermi 3	228

1. ~~**[START COM 2.3-204]** The atmospheric dispersion factors (X/Qs) calculated for the Control Room and Technical Support Center using ARCON96 are currently under revision as part of the effort described in Detroit Edison letter NRC3-10-003, dated February 8, 2010. Detroit Edison will provide the COLA revision to reflect the new atmospheric dispersion factors (X/Qs) calculated for the Control Room and Technical Support Center under separate correspondence to the NRC by March 25, 2010. **[END COM 2.3-204]**~~

NRC3-10-0036
RAI Question No. 02.03.04-5

Enclosure 1

ARCON Input / Output Files
(CD inventory included on following pages)

ARCON Input / Output Files

Directory of D:\

```
08/17/2010  08:09 AM    <DIR>          ARCON96 files
               0 File(s)          0 bytes
               1 Dir(s)           0 bytes free
```

Directory of D:\ARCON96 files

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08/17/2010  08:09 AM    <DIR>          .
08/17/2010  08:09 AM    <DIR>          ..
08/17/2010  08:09 AM    <DIR>          1985-1989 cases
08/17/2010  08:09 AM    <DIR>          2001-2007 cases
               0 File(s)          0 bytes
               4 Dir(s)           0 bytes free
```

Directory of D:\ARCON96 files\1985-1989 cases

```
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08/17/2010  08:09 AM    <DIR>          ..
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08/17/2010  07:44 AM       324,156 F-1986.met
08/17/2010  07:44 AM       324,156 F-1987.met
08/17/2010  07:44 AM       325,012 F-1988.met
08/17/2010  07:44 AM       324,085 F-1989.met
08/17/2010  07:44 AM           566 F01-R78.RSF
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08/17/2010  07:44 AM           566 F03-R78.RSF
08/17/2010  07:44 AM           566 F04-R78.RSF
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08/17/2010  07:47 AM         325,008 F-2004.met
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08/17/2010  07:47 AM         324,120 F-2006.met
08/17/2010  07:47 AM         324,120 F-2007.met
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08/17/2010  07:47 AM         5,132 f45-r7.log
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Attachment 10
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4881 Revision 2)

RAI Question No. 02.03.04-6

NRC RAI 02.03.04-6

As part of the supplemental response to RAI 02.03.04-3 dated March 30, 2010, the applicant provided a revision to FSAR Table 2.0-201. This table provides a comparison of Fermi 3 site characteristic values to the ESBWR DCD site parameter values. In particular, Sheets 19 and 20 of FSAR Table 2.0-201 compare the Fermi 3 control room radwaste building unfiltered inleakage and air intake atmospheric dispersion (χ/Q) site characteristic values to corresponding ESBWR DCD site parameter values. Please justify the values selected as Fermi 3 site characteristics for this comparison.

Response

FSAR Table 2.0-201 provides a comparison of the Fermi 3 site characteristic values to the ESBWR DCD site parameter values. On Sheets 19 and 20 of Table 2.0-201, a comparison is provided of the atmospheric dispersion factors (X/Q values) for the Radwaste Building to the Control Room Unfiltered Inleakage and Air Intakes. A note is provided in Table 2.0-201, Sheet 19, prior to the comparison of the X/Q values that states:

> The PCCS vent X/Q values are assumed to bound the X/Q values for any release from the RW Building based on distance and direction to the CR receptors, and the PCCS vent X/Q values are used to evaluate releases from the RW Building in the DCD (Section 15.3.16). The PCCS X/Q values are compared to the RW Building X/Q values.

The relevant analysis that uses the X/Q values from the RW Building to the Control Room is the liquid-containing tank failure described in DCD Section 15.3.16. The inputs used in the liquid-containing tank failure analysis are identified in DCD Table 15.3-17. For the Control Room X/Q values, footnote * at the bottom of DCD Table 15.3-17 states:

> The atmospheric dispersion factors in this analysis were those for the PCCS vents (Table 2.0-1) and are assumed to bound any release from the Radwaste Building based on distance and direction to the Control Room receptors.

Thus, the ESBWR DCD X/Q values for the Radwaste Building to the Control Room unfiltered inleakage and air intakes shown in FSAR Table 2.0-201 are those for release from the PCCS vents. Consistent with the note in FSAR Table 2.0-201, the Fermi 3 site characteristic values used for comparison to the DCD values are also those for the release from the PCCS vents. The values shown for the Radwaste Building to the Control Room (Unfiltered Inleakage and Air Intakes) are the same as those shown for the PCCS vents to the Control Room on Sheets 15 and 16 of FSAR Table 2.0-201.

Proposed COLA Revision

None.

Attachment 11
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4884 Revision 1)

RAI Question No. 13.06.01-48

NRC RAI 13.06.01-48

In reference to Letter No. 29, dated May 17, 2010, NRC RAI 13.06.01-7, since it is intended to replace the existing NRC-approved PSP for Fermi 2 at some point in time yet undefined, will the Fermi site create a milestone in their implementation schedule to cover incorporating the COLA security plan as the operating unit security plan?

Regulatory Basis: Title 10 CFR 52.6, Completeness and accuracy of information, requires information provided "shall be complete and accurate in all material respects." Subpart B of 10 CFR 52, § 52.79(a) (35) (i) and (ii) requires that information submitted for combined license (COL) include how the applicant will meet the requirements of 10 CFR 73 and descriptions of implementation of the physical security plan.

Response

Since the Fermi Physical Security Plan (PSP) is intended to apply to both Fermi 2 and Fermi 3, and will replace the existing Fermi 2 PSP at some point in time yet defined, replacement of the existing Fermi 2 PSP with the Fermi PSP (COLA security plan) is a necessary milestone in the implementation of the Fermi Security Program.

The milestone for the implementation of the Fermi PSP (as a replacement for the Fermi 2 PSP) will be communicated to the NRC and tracked in the Commitment Tracking Program.

Detroit Edison will submit, within 12 months after issuance of a Combined License, a schedule for implementation of the Fermi Security Program that supports planning for and conduct of NRC inspections. The schedule will be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until either the Fermi Security Program has been fully implemented or the plant has been placed in commercial service, whichever comes first.

Proposed COLA Revision

None.

Attachment 12
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4884 Revision 1)

RAI Question No. 13.06.01-49

NRC RAI 13.06.01-49

In reference to Letter No. 29, dated May 17, 2010, the response to RAI 13.06.01-12 does not clearly address the intended question. The approved Fermi 2 PSP revision 9 is docketed as an operating reactor. Fermi 3 is being addressed as a COL application for review. To complete the review, provide information on the measures in place during the winter (between late fall and early spring) which is not addressed in the PSP revision 9 or Part 8 PSP revision 2. Provide information on the surveillance measures for this restricted area and the adjacent area or approach routes, as required in 10 CFR 73.55 and NEI 03-12 (Revision 6). Clarify whether measures are needed for the other waterways described in Section 1.1, or justify omission of the measures for the winter months.

Regulatory Basis: 10 CFR 73.55(e) (10) (ii) Waterborne vehicles. Identify areas from which a waterborne vehicle must be restricted, and where possible, in coordination with local, State and Federal agencies having jurisdiction over waterway approaches, deploy buoys, markers, or other equipment.

In accordance with site specific analysis, provide periodic surveillance and observation of waterway approaches and adjacent areas. 10 CFR 73.55(e)(1)(ii). Describe in the security plan, physical barriers, barrier systems, and their functions within the physical protection program.

Response

As is described in Sections 11.2.3 of the Fermi Physical Security Plan (PSP), and in Sections 5.8 and 8 of Appendix C of the PSP, the U.S. Coast Guard (USCG) established a permanent security zone adjacent to the Fermi site in 33 CFR 165 (See 67 FR 46385). The security zone is marked with buoys only from early spring until late fall. The buoys are installed and maintained by Detroit Edison in accordance with permits issued by the USCG and the State of Michigan. Buoys located at the intake to the Fermi 2 and Fermi 3 service water pump house are also installed and maintained by Detroit Edison only from early spring to late fall. No federal or state permits are required for these buoys.

The other measures described in Section 11.2.3 of the PSP and Sections 5.8 and 8 of Appendix C of the PSP pertaining to waterborne threats are conducted year round.

Proposed COLA Revision

Section 11.2.3 of the Fermi PSP and Sections 5.8 and 8 of Appendix C of the PSP will be revised to describe the security zone established by the USCG as a permanent security zone.

Attachment 13
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4884 Revision 1)

RAI Question No. 13.06.01-50

NRC RAI 13.06.01-50

In reference to Letter No. 29, dated May 17, 2010, the response to RAI 13.06.01-30 does not clearly address the intended question. The approved Fermi 2 PSP revision 9 is docketed as an operating reactor. Fermi 3 is being addressed as a COL application for review. To complete the review, provide information for the following: The information in the second paragraph is inconsistent with the information presented in Section 11.2.3 of the PSP, where it states the measures described here are only implemented during certain times of the year.

Clarify when these measures are in place and what is in place during other times of the year.

Regulatory Basis: 10 CFR 73.55(e) (10) (ii) Waterborne vehicles. Identify areas from which a waterborne vehicle must be restricted, and where possible, in coordination with local, State and Federal agencies having jurisdiction over waterway approaches, deploy buoys, markers, or other equipment.

In accordance with site specific analysis, provide periodic surveillance and observation of waterway approaches and adjacent areas. 10 CFR 73.55(e) (1) (ii). Describe in the security plan, physical barriers, barrier systems, and their functions within the physical protection program.

Response

As is described in Sections 11.2.3 of the Fermi Physical Security Plan (PSP), and in Sections 5.8 and 8 of Appendix C of the PSP, the U.S. Coast Guard (USCG) established a permanent security zone adjacent to the Fermi site in 33 CFR 165 (See 67 FR 46385). The security zone is marked with buoys only from early spring until late fall. The buoys are installed and maintained by Detroit Edison in accordance with permits issued by the USCG and the State of Michigan. Buoys located at the intake to the Fermi 2 and Fermi 3 service water pump house are also installed and maintained by Detroit Edison only from early spring to late fall. No federal or state permits are required for these buoys.

The other measures described in Section 11.2.3 of the PSP and Sections 5.8 and 8 of Appendix C of the PSP pertaining to waterborne threats are conducted year round.

Proposed COLA Revision

Section 11.2.3 of the Fermi PSP and Sections 5.8 and 8 of Appendix C of the PSP will be revised to describe the security zone established by the USCG as a permanent security zone.

Attachment 14
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4884 Revision 1)

RAI Question No. 13.06.01-51

NRC RAI 13.06.01-51

1. *In Letter No. 26, dated May 3, 2010, NRC RAI 13.06.01-1, the response does not reflect the entire protective strategy of Fermi 2 and 3. Clarify how the strategy for the co-located site will be reflected in the revision of the Safeguards Assessment Report.*

2. *How will the security features identified in the Safeguards Assessment report be tracked for completion (e.g. corrective actions, commitment tracking program etc.)?*

Regulatory Basis: 10 CFR Part 73.55(a): (2) The security plans must identify, describe, and account for site-specific conditions that affect the licensee's capability to satisfy the requirements of this section. (3) The licensee is responsible for maintaining the onsite physical protection program in accordance with Commission regulations through the implementation of security plans and written security implementing procedures.

Response

Although the response to NRC RAI 13.6.01-1 in Detroit Edison letter NRC3-10-0017 dated May 3, 2010 (ML101250501) addressed only the ESBWR Safeguards Assessment Report (NEDE-33391), it is understood that since Fermi 2 and 3 are to be co-located within a single Protected Area, it will be necessary for the site protective strategy to include the plant specific security features of both plants. As such, the ESBWR Safeguards Assessment Report and similar information for Fermi 2 (e.g., target sets and defensive strategy) will be reviewed, assessed, modified and verified in the development of the site protective strategy. Development of the site protective strategy is a necessary milestone in the implementation of the Fermi Security Program.

The milestone for the development of the site protective strategy, as well as the major changes (modifications or revisions) resulting from the development of the protective strategy will be communicated to the NRC and tracked in the Commitment Tracking Program.

Detroit Edison will submit, within 12 months after issuance of a Combined License, a schedule for implementation of the Fermi Security Program that supports planning for and conduct of NRC inspections. The schedule will be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until either the Fermi Security Program has been fully implemented or the plant has been placed in commercial service, whichever comes first.

Proposed COLA Revision

None.

Attachment 15
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4885 Revision 2)

RAI Question No. 02-1

NRC RAI 02-1

FSAR Table 2.0-201 shows that there are Fermi 3 long term dispersion estimate site characteristic values that do not fall within the corresponding ESBWR DCD site parameter values. Section C.III.1.9 of RG 1.206 states that if a COL application FSAR does not demonstrate that the site characteristics fall within the site parameters specified in the design certification, the application shall include a request for an exemption or departure, as appropriate, that complies with the requirements of the reference design certification rule and 10 CFR 52.93. Consequently, please justify why this is not listed as a departure in Part 7 of the Fermi 3 COL application.

Response

As discussed in Fermi 3 FSAR Table 2.0-201, "Evaluation of Site/Design Parameters and Characteristics," the site characteristic values for long term (routine release) atmospheric dispersion estimates are based on the maximally exposed individual (MEI) for each pathway. The site characteristic values for long term (routine release) atmospheric dispersion estimates are defined based on type of sensitive receptor (MEI) and decay time. ESBWR DCD Revision 7, Table 2.0-1 footnote 12 states:

> If a selected site has X/Q values that exceed the ESBWR reference site values, the release concentrations in Table 12.2-17 would be adjusted proportionate to the change in X/Q values using the stack release information in DCD Table 12.2-16. In addition, for a site selected that exceeds the bounding X/Q or D/Q values, the COL applicant will address how the resulting annual average doses (Table 12.2-18b) continue to meet the dose reference values provided in 10 CFR 50 Appendix I using site-specific X/Q and D/Q values.

In response to DCD RAI 12.2-28, GEH letter MFN 09-786, Supplement 1, Revision 1, dated May 26, 2010, GEH provided an update to Table 2.0-1 footnote 12 which states:

> Subsection 12.2.2.1 provides a discussion regarding the X/Q and D/Q values in this table. Per Subsection 12.2.2.2, a COL applicant is responsible for ensuring that offsite dose (using site specific X/Q and D/Q values) due to radioactive airborne effluents complies with the regulatory dose limits in Section II.B and II.C of 10 CFR 50, Appendix I.

This footnote and the discussion in DCD Sections 12.2.2.1 and 12.2.2.2 require a COL applicant to provide site specific analysis of long term (routine release) atmospheric dispersion estimates and the associated dose analysis.

The Fermi 3 long term atmospheric dispersion estimates are not referenced as a departure from the ESBWR DCD for the following four reasons, discussed in detail further below:

1. The departure definition of RG 1.206 is not applicable to the Fermi 3 long term atmospheric dispersion estimates presented in FSAR Chapter 2.

2. The departure definitions of current design certification rules are not applicable to the Fermi 3 long term atmospheric dispersion estimates presented in FSAR Chapter 2.
3. The 10 CFR 52.79(d)(1) and NUREG 0800 discussions of site parameters that must be met by a site are not applicable to the ESBWR DCD long term atmospheric dispersion estimates presented in FSAR Chapter 2.
4. The footnote of the ESBWR DCD Table 2.0-1 requires Fermi 3 analysis of site parameters associated with long term atmospheric dispersion estimates, to be extended to the dose analysis of Chapter 12. The guidance of Section C.III.1.9 of RG 1.206 is therefore relevant to the dose analysis of Chapter 12.

1. The departure definition of RG 1.206 is not applicable to ESBWR DCD long term atmospheric dispersion estimates.

A departure is defined in RG 1.206 C.III.1.6 as "a plant specific deviation from design information in a standard design certification rule." The site specific atmospheric dispersion estimates do not constitute a deviation from DCD design information. The X/Q and D/Q estimates presented in the DCD are not utilized as bounding analysis to determine or demonstrate site suitability, as each COL applicant is responsible to perform site specific analysis. The DCD X/Q and D/Q estimates are utilized as a reference to support ESBWR applicability to a "reasonable number of sites" as discussed in DCD RAI 12.2-28 and the associated changes to DCD Section 12.2.2.1. The DCD analysis of typical atmospheric dispersion for ESBWR sites is not a bounding analysis for the ESBWR design or COL applicants referencing the ESBWR design. The Fermi 3 COLA does not present a deviation from the DCD design information, on the contrary, the site specific X/Q and D/Q estimates and associated dose analysis are the responsibility of the applicant as defined by the DCD.

2. The departure definitions of current design certification rules are not applicable to ESBWR DCD long term atmospheric dispersion estimates.

As discussed above, a departure is defined as a plant specific deviation from design information in a standard design certification rule. The GEH ESBWR design certification rule has not yet been finalized, although other design certification rules (e.g. 10 CFR 52 Appendix D Section II.G) provide the following definition:

G. Departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses means:
   1. Changing any of the elements of the method described in the plant-specific DCD unless the results of the analysis are conservative or essentially the same; or
   2. Changing from a method described in the plant-specific DCD to another method unless that method has been approved by the NRC for the intended application.

The Fermi 3 COLA has not changed the method of evaluation described in the DCD. The Fermi 3 COLA presents the required site specific atmospheric dispersion estimates and associated dose analysis, utilizing methods specified by the DCD.

3. The 10 CFR 52.79(d)(1) and NUREG 0800 discussions of design certification site parameters that must be met by COL applicants are not applicable to ESBWR DCD long term atmospheric dispersion estimates.

According to NUREG 0800, 2.0.I, Standard Design Certification Reviews, site parameters used in bounding evaluations of the certified design define the requirements for the design that must be met by a site. The ESBWR DCD X/Q and D/Q estimates are not utilized in any bounding evaluations of the certified design, as each COLA is required to present a site specific evaluation. There is no DCD bounding evaluation associated with the atmospheric dispersion estimates presented in the DCD.

10 CFR 52.79(d)(1) states that the COL applicant must present "information sufficient to demonstrate that the site characteristics fall within the site parameters specified in the design certification." As noted in the DCD table 2.0-1, the X/Q and D/Q estimates are not COL bounding site parameters as the "COL applicant is responsible for ensuring that offsite dose (using site specific X/Q and D/Q values) due to radioactive airborne effluents complies with the regulatory dose limits in Section II.B and II.C of 10 CFR 50, Appendix I." The DCD X/Q and D/Q estimates presented in Chapter 2 and associated dose analysis of Chapter 12 are not relevant to the Fermi 3 safety analysis, as the COL applicant is responsible for providing a site specific analysis. The "site parameters specified in the design certification" is the dose analysis of Chapter 12 as referenced in DCD Table 2.0-1 footnote 12.

The ESBWR Safety Evaluation Report (ML100491205) validates this position in Section 2.3.5.3, "Staff Evaluation" of the Long Term Dispersion Estimates for Routine Releases. The SER concludes that the ESBWR X/Q and D/Q site parameters are appropriate for a reasonable number of potential sites. To draw this conclusion, the staff relied on site specific dose analyses for three potential sites. Although the site specific X/Q and D/Q estimates for these potential sites do not fall within the ESBWR parameters, the SER concludes that "the 10 CFR Part 50, Appendix I dose criteria can be met for the three plant sites it evaluated using the ESBWR design airborne release source term and site-specific X/Q and D/Q values." Additionally the SER states "the COL holder will be required to comply with 10 CFR Part 50, Appendix I, during normal operations, regardless of whether the COL applicant's long-term dispersion site characteristics are bounded by the long-term dispersion site parameters cited in the DCD."

4. The footnote of the ESBWR DCD Table 2.0-1 requires Fermi 3 analysis of site parameters associated with long term atmospheric dispersion estimates, to be extended to the dose analysis of Chapter 12.

As discussed above, Section C.III.1.9 of RG 1.206 states that if a COL application does not demonstrate that the site characteristics fall within the site parameters specified in the design certification, the application shall include a request for an exemption or departure, as appropriate, that complies with the requirements of the reference design certification rule and 10 CFR 52.93. The site parameters associated with long term atmospheric dispersion estimates specified in the ESBWR DCD Table 2.0-1 reference footnote 12 requiring site specific X/Q and D/Q estimates and associated dose analysis, that is, the X/Q and D/Q estimates are not site parameters, those site parameters of the DCD are extended to the dose analysis of Chapter 12 as the dispersion and deposition estimates are exclusively developed to analyze potential exposure. In this way, the Fermi 3 COL application demonstrates that the estimated atmospheric dispersion site characteristics fall within the site parameters specified in the DCD by presenting a site specific dose analysis as required in Chapter 12 of the Fermi 3 FSAR.

Conclusion

The Fermi 3 site specific long term (routine release) atmospheric dispersion analysis does not meet the definitions of a departure of RG 1.206 or current design certification rules. Additionally the ESBWR DCD long term atmospheric dispersion estimates are not site parameters used in bounding analysis as discussed in NUREG 0800 and 10 CFR 52.79(d)(1) and therefore these DCD estimates do not define the requirements for the design that must be met by a COL applicant. Furthermore, the DCD has extended the site parameters identified in Chapter 2 to the dose analysis of Chapter 12, the Fermi 3 site specific dose analysis of Chapter 12 demonstrates that the Fermi 3 atmospheric dispersion site characteristics fall within the site parameters specified in the design certification. For these reasons, the Fermi 3 long term atmospheric dispersion estimates are not referenced as a departure.

Proposed COLA Revision

None

Attachment 16
NRC3-10-0036

Response to RAI Letter No. 39
(eRAI Tracking No. 4891 Revision 2)

RAI Question No. 17.5-23

NRC RAI 17.5-23

Regulatory Guide (RG) 1.206, section C.I.1.9.1, "Conformance with Regulatory Guides," states:

Certified designs have already provided information addressing conformance with regulatory guides that were in effect 6 months before the submittal date of the design certification application. In accordance with the provisions of 10 CFR 52.63, "Finality of Standard Design Certifications," COL applicants who reference a certified design are not required to re-address conformance with regulatory guides for the portions of the facility design included in the referenced certified design. However, for the site-specific portions of the facility design that are not included in the referenced certified design, a COL applicant should address conformance with regulatory guides in effect 6 months before the submittal date of the COL application.

The Fermi 3 Combined License Application, Part 2: Final Safety Analysis Report (FSAR), Table 1.9-202, "Conformance with Regulatory Guides," evaluates conformance to various revisions of RG 1.26 and 1.29 and also references DCD Tables 1.9-21, 1.9-21a, and 1.9-21b. Please update FSAR Table 1.9-202 and the Fermi 3 QAPD (FSAR Appendix 17AA), Part IV, "Regulatory Commitments," to include only site-specific portions of the facility design that are not included in the referenced certified design.

Additionally, FSAR Table 1.9-202 evaluates conformance for RG 1.8, Rev. 3, May 2000, "Qualification and Training of Personnel for Nuclear Power Plants," RG 1.28, Rev. 3, August 1985, "Quality Assurance Program Requirements (Design and Construction)" and RG 1.33, Rev. 2, February 1978, "Quality Assurance Program Requirements (Operations)." Exceptions are noted for use of NQA-1 (1994 Edition) as specified in the QAPD. However, the Fermi 3 QAPD, only commits to ASME NQA-1-1994 Edition, as stated in Part IV, "Regulatory Commitments," and does not commit to RG 1.8, RG 1.28, and RG 1.33.

RG 1.8, RG 1.28, and RG 1.33 provide methods acceptable to the staff for describing in the QAPD how many requirements of Appendix B to 10 CFR Part 50 will be met. The Fermi 3 QAPD should commit to these regulatory guides or provide justification of any proposed alternatives. Exceptions to methods described by these regulatory positions should be explicitly addressed in the Fermi 3 QAPD with detailed justification sufficient for the staff to evaluate compliance with the requirements of Appendix B to 10 CFR Part 50. Further, the Fermi 3 QAPD should be revised to clarify that changes to regulatory commitments described in the QAPD or incorporated by reference are subject to the change process defined by 10 CFR 50.54(a).

Note: the NRC staff has determined that NQA-1-1994 by itself does not meet each of the regulatory positions in RG 1.33. Please address each of the regulatory positions in RG 1.33 in a revised QAPD.

Response

Conformance to RG 1.26, 1.29, 1.8, 1.28, and 1.33 has been clarified in the attached markups for Fermi 3 FSAR Chapter 1 and Appendix 17AA QAPD. The Fermi 3 QAPD Part IV "Regulatory Commitments" and Part V "Additional Quality Assurance and Administrative Controls for the Plant Operational Phase" are being updated to incorporate NEI 06-14 Revision 9. Clarification was added to FSAR Table 1.9-202 and QAPD Part IV that require changes to regulatory commitments described in the QAPD to be subject to the change process defined by 10 CFR 50.54(a). Each of the regulatory positions in RG 1.33 has been addressed as shown in the attached markups to FSAR Table 1.9-202 and Fermi 3 QAPD Part V.

Proposed COLA Revision

FSAR Table 1.9-202 and Appendix 17AA Fermi 3 QAPD will be revised as shown on the attached markups.

Markup of Detroit Edison COLA
(following 25 pages)

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.

Table 1.9-202 Conformance with Regulatory Guides (Sheet 2 of 25)
[EF3 COL 1.9-3-A]

RG Number	Title	Revision	Date	RG Position	Evaluation
1.8 [*]	Qualification and Training of Personnel for Nuclear Power Plants	Rev. 3	May-00	~~C.1~~ ~~C.2~~ Insert 1.8	~~Conforms.~~ ~~Conforms, with the following exceptions~~ ~~(1) instead of NQA-1-1983 or NQA-1-1989, NQA-1-1994 is utilized as specified in the QAPD~~ ~~(2) experience requirements cannot be met prior to operations as described in Appendix 13BB.~~
1.9	Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants	Rev. 4	Mar-07	General	Not applicable
1.11	Instrument Lines Penetrating Primary Reactor Containment (Safety Guide 11) Supplement to Safety Guide 11, Backfitting Considerations	Rev. 0	Feb-72	C.1, C.2, E	Conforms
1.12	Nuclear Power Plant Instrumentation for Earthquakes	Rev. 2	Mar-97	C.1, C.4 – C.7, C.3, C.8	Conforms Conforms. The seismic monitoring program, including the necessary test and operating procedures, will be implemented prior to receipt of fuel on site.
1.13	Spent Fuel Storage Facility Design Basis	Rev. 2	Mar-07	General	Conforms
1.14	Reactor Coolant Pump Flywheel Integrity	Rev. 1	Aug-75	General	Not applicable
1.16	Reporting of Operating Information–Appendix A Technical Specifications	Rev. 4	Aug-75	General	Conforms with the following exceptions: Reporting per C.1.b(2) and C.1.b(3) is no longer required.
1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing	Rev. 3	Mar-07	C.1 C.2 C.3	Conforms. Conforms. Conforms.

Table 1.9-202 Conformance with Regulatory Guides (Sheet 4 of 25)

[EF3 COL 1.9-3-A]

RG Number	Title	Revision	Date	RG Position	Evaluation
1.25	Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors	Rev. 0	Mar-72	General	Not applicable. RG 1.183 is used.
1.26 *	Quality Group Classifications and Standards or Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants	Rev. 4	Mar-07	~~All~~ Insert 1.26	~~Exception: The requirements for quality group classifications and standards are defined by the DCD which implements Rev. 3. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b.~~
		~~Rev. 3~~	~~Feb-76~~	~~All~~	~~Conforms. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b.~~
1.27	Ultimate Heat Sink for Nuclear Power Plants	Rev. 2	Jan-76	General	The UHS is within the scope of the referenced certified design and is addressed in DCD Section 9.2.5.
1.28 *	Quality Assurance Program Requirements (Design and Construction)	Rev. 3	Aug-85	~~General~~ Insert 1.28	~~Exception: The QAPD identified in Section 17.5 addresses a QA program based on the newer NQA-1-1994, as provided for in SRP 17.5.~~
1.29 *	Seismic Design Classification	Rev. 4	Mar-07	~~General~~ Insert 1.29	~~Exception: The requirements for seismic design classification are defined by the DCD which implements Rev. 3. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b.~~
		~~Rev. 3~~	~~Sep-78~~	~~All~~	~~Conforms. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b..~~

Table 1.9-202 Conformance with Regulatory Guides (Sheet 5 of 25)

[EF3 COL 1.9-3-A]

RG Number	Title	Revision	Date	RG Position	Evaluation
1.30	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment	Rev. 0	Aug-72	General	Exception: The QAPD identified in Section 17.5 addresses a QA program based on a newer NQA-1-1994, as discussed in SRP 17.5.
1.31	Control of Ferrite Content in Stainless Steel Weld Metal	Rev. 3	Apr-78	General	Conforms. Operational program implementation is described in Section 13.4.
1.32	Criteria for Power Systems for Nuclear Power Plants	Rev. 3	Mar-04	General	Conforms.
1.33 *	Quality Assurance Program Requirements (Operation)	Rev. 2	Feb-78	~~General~~ Insert 1.33	~~Exception: The QAPD topical report identified in Section 17.5 follows NQA-1 rather than the older standards referenced in RG 1.33.~~
1.34	Control of Electroslag Weld Properties	Rev. 0	Dec-72	General	Conforms. Operational program implementation is described in Section 13.4
1.35	Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments	Rev. 3	Jul-90	General	Not applicable
1.35.1	Determining Prestressing for Inspection of Prestressed Concrete Containments	Rev. 0	Jul-90	General	Not applicable
1.36	Nonmetalic Thermal Insulation for Austenitic Stainless Steel	Rev. 0	Feb-73	General	Conforms. Operational program implementation is described in Section 13.4
1.37 *	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants	Rev. 1	Mar-07	~~General~~ Insert 1.37	~~Conforms~~

Table 1.9-202 Conformance with Regulatory Guides (Sheet 7 of 25)
[EF3 COL 1.9-3-A]

RG Number	Title	Revision	Date	RG Position	Evaluation
1.52	Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants	Rev. 3	Jun-01	General	Conforms
1.53	Application of the Single-Failure Criterion to Safety Systems	Rev. 2	Nov-03	General	Conforms
1.54 *	Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants	Rev. 1	Jul-00	General	Conforms
1.56	Maintenance of Water Purity in Boiling Water Reactors	Rev. 1	Jul-78	General	Conforms.
1.57	Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components	Rev. 1	Mar-07	General	Conforms
1.59	Design Basis Floods for Nuclear Power Plants (Errata Published 7/30/80)	Rev. 2	Aug-77	General	Conforms
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	Rev. 1	Dec-73	General	Conforms
1.61	Damping Values for Seismic Design of Nuclear Power Plants	Rev. 1	Mar-07	General	Conforms
1.62	Manual Initiation of Protective Actions	Rev. 0	Oct-73	General	Conforms
1.63	Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants	Rev. 3	Feb-87	General	Conforms
1.65	Materials and Inspections for Reactor Vessel Closure Studs	Rev. 0	Oct-73	General	Conforms

Table 1.9-202 Conformance with Regulatory Guides (Sheet 25 of 25)

[EF3 COL 1.9-3-A]

RG Number	Title	Revision	Date	RG Position	Evaluation
8.32	Criteria for Establishing a Tritium Bioassay Program	Rev. 0	Jul-88	General	Exception. Per NUREG-1736, RG 8.32 is outdated. RG 8.9 is used. Operational program implementation is described in Section 13.4
8.33	Quality Management Program	Rev. 0	Oct-91	General	Not applicable to nuclear power plants. RG 8.33 applies to nuclear medicine.
8.34	Monitoring Criteria and Methods To Calculate Occupational Radiation Doses	Rev. 0	Jul-92	General	Conforms. Operational program implementation is described in Section 13.4
8.35	Planned Special Exposures	Rev. 0	Jun-92	General	Conforms. Operational program implementation is described in Section 13.4
8.36	Radiation Dose to the Embryo/Fetus	Rev. 0	Jul-92	General	Conforms. Operational program implementation is described in Section 13.4
8.38	Control of Access to High and Very High Radiation Areas of Nuclear Plants	Rev. 1	May-06	General	Conforms. Operational program implementation is described in Section 13.4

* RG conformance discussed in the Fermi 3 QAPD, changes shall be in accordance with 10 CFR 50.54(a).

Inserts to the last two columns of FSAR Table 1.9-202

RG Position Insert 1.8	Evaluation
General	This regulatory guide endorses ANSI/ANS-3.1-1993, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," with certain additions and exceptions that are listed in the Regulatory Position of this guide. Some of the exceptions are endorsements of certain sections of two other standards, ANSI N18.7-1976 (ANS-3.2), "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants," and ANSI/ASME NQA-1-1983, "Quality Assurance Program Requirements for Nuclear Power Plants." Rather than to commit to those Standards in the QAPD, appropriate requirements have been directly incorporated into the text if not found in NQA-1-1994. These requirements are consistent with the identified acceptance criteria in SRP Section 17.5. NEI 06-13A as incorporated by FSAR Chapter 13 provides acceptable alternatives for cold licensed operators selection, training, and qualification requirements.
C.1	Definitions in ANSI/ANS-3.1-1993. Conformance with ANSI/ANS-3.1-1993 is addressed in FSAR Chapter 13.
C.2.1	Alternatives and substitutions for education and experience for quality assurance personnel are reflected in Part II, Section 2.6 of the QAPD.
C.2.2 - C.2.10	Described in Part II, Section 1 of the QAPD and the operating organization described in FSAR Chapter 13.
C.2.11	The QAPD identifies an alternative for this regulatory position in Part II, Section 2.8. As documented in SER ML070510300, the qualification criteria in the QAPD is acceptable and consistent with SRP Section 17.5, paragraph II. T.
C.2.12	The QAPD identifies an alternative for this regulatory position in Part II, Section 2.8. As documented in SER ML070510300, the qualification criteria in the QAPD is acceptable and consistent with SRP Section 17.5, paragraph II.S.
C.2.13	Described in Part II, Section 1 of the QAPD and the operating organization described in FSAR Chapter 13.
C.2.14 - C.2.15	The QAPD identifies an alternative for this regulatory position in Part V, Section 2.2. As documented in SER ML070510300, the QAPD template follows SRP Section 17.5, paragraph II. W for providing guidance to the applicant to establish an independent review program for activities occurring during the operational phase.

Inserts to the last two columns of FSAR Table 1.9-202

RG
Position Evaluation

Insert 1.26

All	Conforms for site specific SSCs which are not classified by the ESBWR DCD.

Insert 1.28

General	This regulatory guide endorses the basic and supplementary requirements in ANSI/ASME NQA-1-1983, "Quality Assurance Program Requirements for Nuclear Power Plants" and the ANSI/ ASME NQA-1a-1983 Addenda along with the regulatory Positions discussed below for the establishment and execution of quality assurance programs during the design and construction phases of nuclear power plants. The QAPD provides adequate guidance for establishing a quality assurance program that complies with Appendix B to 10 CFR Part 50 by using ASME NQA standard NQA-1-1994, as supplemented by additional regulatory guidance and industry guidance. Reference approval for Exelon submittal to use NQA-1-1994 as documented in ADAMS Accession number ML023440300.
C.1	The QAPD identifies an alternative for this regulatory position in Part II, Section 2.7. As documented in SER ML070510300, the qualification criteria in the QAPD is acceptable and consistent with SRP Section 17.5, paragraph II.T. Note that SRP Section 17.5 paragraph II.T.5 and 6 represent alternatives to this regulatory position that were approved in SER ML050700416.
C.2	Addressed in the QAPD, Part II, Section 17.1
C.3	In establishing the independent audit program, the QAPD commits to comply with the quality standards described in NQA-1-1994, Basic Requirement 18 and Supplement 18S-1. It follows SRP Section 17.5, paragraph II.R, for establishing the necessary measures to implement audits to verify that activities covered by the QAPD are performed in conformance with the requirements established. The scheduling of Internal Audits is addressed in QAPD Part II Section 18.1 and is consistent with position C.3.1 for the phase prior to placing the facility into operation. External Audits are addressed in QAPD Part II Section 7.1. The requirements are consistent with SRP paragraph II.R.11 and II.R.12. These requirements address regulatory position C.3.2.

Insert 1.29

All	Conforms for site specific SSCs which are not classified by the ESBWR DCD.
C.4	The QAPD described in Section 17.5 of the FSAR addresses the QA program requirements applied to safety-related activities.

Inserts to the last two columns of FSAR Table 1.9-202

RG Position	Evaluation
Insert 1.33	
General	RG 1.33 endorses ANSI N18. 7-1976/ANS-3.2 for complying with the quality assurance program requirements for the operation phase of nuclear power plants, subject to five regulatory positions. Attachment 2 to NEI 06-14 provides a comparison of QA requirements established within NQA-1-1994 and NEI 06-14 to provide an alternate method of meeting 10 CFR 50, Appendix B during the operational phase in lieu of committing to the requirements of ANSI N18.7-1976/ANS-3.2.
C.1	QAPD Part II, Sections 5 and 6, and Part V, Section 3 address requirements for procedures consistent with requirements addressed in SRP 17.5 section II.F and ANSI N18.7-1976.
C.2	The QAPD identifies commitments to ASME NQA-1-1994 instead of the listed ANSI N45.2 series standards listed. Regulatory Guides 1.28, 1.37, 1.38, 1.39, 1.30, 1.94, 1.58, 1.116, 1.88, 1.74, 1.64, and 1.123 are listed for positions on the ANSI N45.2 series standards. RG 1.8, 1.17, and 1.54 are included as addressing other ANSI Standards. RG 1.8, 1.28, and 1.37 have been revised to reference newer standards and are discussed in the QAPD Part IV and this table. RG 1.17, 1.58, 1.64, 1.74, 1.88, and 1.123 have been withdrawn. For RG 1.30, 1.38, 1.94 and 1.116 the QAPD provides an acceptable alternative using ASME NQA-1-1994, Subparts 2.2, 2.4, 2.5, and 2.8 as identified in Part II Sections 10.3 and 13.2 and SRP 17.5 Section II.U.2. For RG 1.39 the QAPD provides an acceptable alternative in Part II, Section 13.1, which is consistent with SRP Section 17.5, paragraph II.M for operations; controls during design and construction are addressed in the commitment in Section 13.2. RG 1.54 is addressed in this table.
C.3	The QAPD provides an alternative for this position by addressing Independent Review requirements specifically in Part V, Section 2.2 consistent with SRP 17.5 Section II.W rather than referencing ANSI N18.7. Item 2.2.c specifically relates to the concern of this regulatory position.
C.4	In establishing the independent audit program, the QAPD provides an alternative for this position by committing to the quality standards described in NQA-1-1994, Basic Requirement 18 and Supplement 18S-1. The QAPD follows SRP Section 17.5, paragraph II.R, for establishing the necessary measures to implement audits to verify that activities covered by the QAPD are performed in conformance with the requirements established.
C.5	The QAPD provides an alternative to this position by providing adequate guidance for establishing a quality assurance program that complies with Appendix B to 10 CFR Part 50 by using ASME NQA standard NQA-1-1994, as supplemented by the QAPD.

Inserts to the last two columns of FSAR Table 1.9-202

RG Position | Evaluation

Insert 1.37

All	Conforms
General	QAPD Part II, Section13.2 addresses the commitment to NQA-1-1994, Part II, Subpart 2.1.
C.3	QAPD Part II, Section13.2 addresses the commitment to NQA-1- 1994, Part II, Subpart 2.2.

SECTION 17 QUALITY ASSURANCE RECORDS

Fermi 3 shall establish the necessary measures and governing procedures to ensure that sufficient records of items and activities affecting quality are developed, reviewed, approved, issued, used, and revised to reflect completed work. The provisions of such procedures establish the scope of the records retention program for Fermi 3 and include requirements for records administration, including receipt, preservation, retention, storage, safekeeping, retrieval, access controls, user privileges, and final disposition.

17.1 Record Retention

Measures are required to be established that ensure that sufficient records of completed items and activities affecting quality are appropriately stored. ~~Such records and their retention times are defined in appropriate procedures.~~ In all cases where state, local, or other agencies have more restrictive requirements for record retention, those requirements will be met.

17.2 Electronic Records

optical discs for

When using electronic records storage and retrieval systems, Fermi 3 complies with NRC guidance in Generic Letter 88-18, "Plant Record Storage on Optical Disks." Fermi 3 will manage the storage of QA Records in electronic media consistent with the intent of RIS 2000-18 and associated NIRMA Guidelines TG 11-1998, TG15-1998, TG16-1998, and TG21-1998.

17.3 NQA-1-1994 Commitment / Exceptions

In establishing provisions for records, Fermi 3 commits to compliance with NQA-1-1994, Basic Requirement 17 and Supplement 17S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 17S-1
  - Supplement 17S-1, section 4.2(b) requires records to be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers. For hard-copy records maintained by Fermi 3, the records are suitably stored in steel file cabinets or on shelving in containers, except that methods other than binders, folders or envelopes may be used to organize the records for storage.

Records of activities for design, engineering, procurement, manufacturing, construction, inspection and test, installation, pre-operation, startup, operations, maintenance, modification, decommissioning, and audits and their retention times are defined in appropriate procedures. The records and retention times are based on Regulatory Position C.2 and Table 1, of Regulatory Guide 1.28, Revision 3 for design, construction, and initial start-up. Retention times for operations phase records are based on construction records that are similar in nature.

Replace with Insert 1

PART IV REGULATORY COMMITMENTS

NRC Regulatory Guides and Quality Assurance Standards

This section identifies the NRC Regulatory Guides and the other quality assurance standards which have been selected to supplement and support the Fermi 3 QAPD. Fermi 3 commits to compliance with these standards to the extent described herein. Commitment to a particular Regulatory Guide or other QA standard does not constitute a commitment to the Regulatory Guides or QA standards that may be referenced therein.

1.1 Regulatory Guides

Regulatory Guide 1.26, Revision 4, March 2007- Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants

Regulatory Guide 1.26 defines classification of systems and components.

Fermi 3 commits to the applicable regulatory position guidance provided in this regulatory guide for Fermi 3 components outside the scope of the DCD. The requirements for quality group classifications and standards defined by the DCD meet the regulatory guidance of Revision 3.

Regulatory Guide 1.26, Revision 3, February 1976 - Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants

Regulatory Guide 1.26 defines classification of systems and components.

Fermi 3 commits to the applicable regulatory position guidance provided in this regulatory guide for Fermi 3 components within the scope of the DCD with the exceptions described in the ESBWR DCD Table 1.9-21, Table 1.9-21a, and Table 1.9-21b.

Regulatory Guide 1.29, Revision 4, March 2007- Seismic Design Classification.

Regulatory Guide 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).

Fermi 3 commits to the applicable regulatory position guidance provided in this regulatory guide for Fermi 3 systems outside the scope of the DCD. The requirements for seismic design classification defined by the DCD meet the regulatory guidance of Revision 3.

Regulatory Guide 1.29, Revision 3, September 1978 - Seismic Design Classification

Regulatory Guide 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).

Fermi 3 commits to the applicable regulatory position guidance provided in this regulatory guide for Fermi 3 systems within the scope of the DCD with the exceptions described in the ESBWR DCD Table 1.9-21, Table 1.9-21a, and Table 1.9-21b.

Regulatory Guide 1.37, Revision 1, March 2007 - Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants

Regulatory Guide 1.37 provides guidance on specifying water quality and precautions related to the use of alkaline cleaning solutions and chelating agents.

Fermi 3 commits to the applicable regulatory position guidance provided in this regulatory guide for Fermi 3 during the construction and preoperational phase of the plant.

Standards:

ASME NQA-1-1994 Edition – Quality Assurance Requirements for Nuclear Facility Applications

Fermi 3 commits to NQA-1-1994, Parts I and II, as described in the foregoing sections of this document.

Nuclear Information and Records Management Association, Inc. (NIRMA) Technical Guides (TGs)

Fermi 3 commits to NIRMA TGs as described in Part II, SECTION 17 of this document.

Add Insert 2

Insert 1

PART IV REGULATORY COMMITMENTS

NRC Regulatory Guides and Quality Assurance Standards

This section identifies the NRC Regulatory Guides (RG) and the other quality assurance standards which have been selected to supplement and support the Fermi 3 QAPD. Fermi 3 complies with these standards to the extent described or referenced. Commitment to a particular RG or standard does not constitute a commitment to other RGs or standards that may be referenced therein.

Regulatory Guides:

See FSAR Chapter 1, Table 1.9-202 for the Fermi 3 evaluation of conformance with the guidance in NRC Regulatory Guides in effect six months prior to the submittal date of the application. Changes in QAPD RG conformance, such as new or different clarifications or alternatives, will be in accordance with 10 CFR 50.54(a).

Regulatory Guide 1.8, Rev. 3, May 2000, Qualification and Training of Personnel for Nuclear Power Plants

Regulatory Guide 1.8 provides guidance that is acceptable to the NRC staff regarding qualifications and training for nuclear power plant personnel.

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Regulatory Guide 1.26, Revision 4, March 2007, Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants

Regulatory Guide 1.26 defines classification of systems and components.

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Regulatory Guide 1.28, Rev. 3, August 1985, Quality Assurance Program Requirements (Design and Construction)

Regulatory Guide 1.28 describes a method acceptable to the NRC staff for complying with the provisions of Appendix B with regard to establishing and implementing the requisite quality assurance program for the design and construction of nuclear power plants.

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Insert 1 (Continued)

Regulatory Guide 1.29, Revision 4, March 2007, Seismic Design Classification

Regulatory Guide 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Regulatory Guide 1.33, Revision 2, February 1978, Quality Assurance Program Requirements (Operations)

Regulatory Guide 1.33 describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to overall quality assurance program requirements for the operation phase of nuclear power plants.

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Regulatory Guide 1.37, Revision 1, March 2007, Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants

Regulatory Guide 1.37 provides guidance on specifying water quality and precautions related to the use of alkaline cleaning solutions and chelating agents.

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Regulatory Guide 1.54, Revision 1, July 2000 - Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants

Regulatory Guide 1.54 provide guidance for the application of protective coatings within nuclear power plants to protect surfaces from corrosion, contamination from radionuclides, and for wear protection.

Fermi 3 identifies conformance and exceptions for the applicable regulatory position guidance provided in this regulatory guide in FSAR Chapter 1.

Standards:

ASME NQA-1-1994 Edition - Quality Assurance Requirements for Nuclear Facility Applications

Fermi 3 commits to NQA-1-1994, Parts I, II, and III, as described in Parts II and V of this document.

Insert 1 (Continued)

<u>Nuclear Information and Records Management Association, Inc. (NIRMA) Technical Guides (TGs)</u> Fermi 3 commits to NIRMA TGs as described in Part II, Section 17.

Insert 2

PART V. ADDITIONAL QUALITY ASSURANCE AND ADMINISTRATIVE CONTROLS FOR FERMI 3 OPERATIONAL PHASE

SECTION 1 DEFINITIONS

Fermi 3 uses the definitions of terms as provided in Section 4 of the Introduction of NQA-1-1994 in interpreting the requirements of NQA-1-1994 and the other standards to which the QAPD commits. In addition, definitions are provided for the following terms not covered in NQA-1-1994:

administrative controls: rules, orders, instructions, procedures, policies, practices and designations of authority and responsibility

experiments: performance of plant operations carried out under controlled conditions in order to establish characteristics or values not previously known

independent review: review completed by personnel not having direct responsibility for the work function under review regardless of whether they operate as a part of an organizational unit or as individual staff members (see review)

nuclear power plant: any plant using a nuclear reactor to produce electric power, process steam or space heating

on-site operating organization: on-site personnel concerned with the operation, maintenance and certain technical services

operating activities: work functions associated with normal operation and maintenance of the plant, and technical services routinely assigned to the on-site operating organization

operational phase: that period of time during which the principal activity is associated with normal operation of the plant. This phase of plant life is considered to begin formally with commencement of initial fuel loading, and ends with plant decommissioning

review: a deliberately critical examination, including observation of plant operation, evaluation of assessment results, procedures, certain contemplated actions, and after-the-fact investigations of abnormal conditions

supervision: direction of personnel activities or monitoring of plant functions by an individual responsible and accountable for the activities they direct or monitor

surveillance testing: periodic testing to verify that safety related structures, systems, and components continue to function or are in a state of readiness to perform their functions

system: an integral part of nuclear power plant comprising components which may be operated or used as a separate entity to perform a specific function

Insert 2 (Continued)

SECTION 2 REVIEW OF ACTIVITIES AFFECTING SAFE PLANT OPERATION

2.1 Onsite Operating Organization Review

The Fermi 3 onsite organization employs reviews, both periodic and as situations demand, to evaluate plant operations and plan future activities. The important elements of the reviews are documented and subjects of potential concern for the independent review described below are brought to the attention of the [manager responsible for Plant Operations (plant manager)]. The reviews are part of the normal duties of plant supervisory personnel in order to provide timely and continuing monitoring of operating activities in order to assist the [manager responsible for Plant Operations (plant manager)] in keeping abreast of general plant conditions and to verify that day-to-day operations are conducted safely in accordance with the established administrative controls. The [manager responsible for Plant Operations (plant manager)] ensures the timely referral of the applicable matters discussed in the reviews to appropriate management and independent reviewers.

2.2 Independent Review Body

A group may function as an Independent Review Body (IRB). In discharging its review responsibilities, the IRB keeps safety considerations paramount when opposed to cost or schedule considerations. One or more organizational units may collectively perform this function.

1. IRB reviews are supplemented as follows:
   a. A qualified person, independent of the preparer, reviews proposed changes in the procedures as described in the FSAR prior to implementation of the change to determine if a technical specification change or NRC approval is required.
   b. Audits of selected changes in the procedures described in the FSAR are performed to verify that procedure reviews and revision controls are effectively implemented.
   c. Competent individual(s) or group(s) other than those who performed the original design but who may be from the same organization verify that changes to the facility do not result in a loss of adequate design or safety margins.
2. The results of IRB reviews of matters involving the safe operation of the facility are periodically independently reviewed. This review is intended to support management in identifying and resolving issues potentially affecting safe plant operation. This review supplements the existing corrective action programs and audits.
   a. The review is performed by a team consisting of personnel with experience and competence in the activities being reviewed, but independent from cost and schedule considerations and from the organizations responsible for those activities.

      The IRB supervisor or chairman has a minimum six (6) years combined managerial and technical support experience. The members of the IRB should have a minimum of five

Insert 2 (Continued)

years of experience in their own area of responsibility as applicable to the activities being reviewed (i.e., a minimum of five years of experience in one of the twelve areas listed below:

(1) Nuclear power plant operations

(2) Nuclear engineering

(3) Chemistry and radiochemistry

(4) Metallurgy

(5) Nondestructive testing

(6) Instrumentation and control

(7) Radiological safety

(8) Mechanical engineering

(9) Electrical engineering

(10) Administrative control and quality assurance practices

(11) Training

(12) Emergency plans and related procedures and equipment).

b. The review is supplemented by outside consultants or organizations as necessary to ensure the team has the requisite expertise and competence.

c. Results of the review are documented and reported to responsible management.

d. Management periodically consider issues that they determine warrant special attention, such as deficient plant programs, declining performance trends, employee concerns, or other issues related to safe plant operations and determine what issues warrant the review.

e. Management determines the scheduling and scope of review and the composition of the team performing the review.

SECTION 3 OPERATIONAL PHASE PROCEDURES

The following is a description of the various types of procedures used by Fermi 3 to govern the design, operation, and maintenance of its nuclear generating plants. Fermi 3 follows the guidance of Appendix A to Regulatory Guide 1.33 in identifying the types of activities that should have procedures or instructions to control the activity. Each procedure shall be sufficiently detailed for a qualified individual to perform the required function without direct supervision, but need not provide a complete description of the system or plant process.

Insert 2 (Continued)

3.1 Format and Content

Procedure format and content may vary from one location to the other. However, procedures include the following elements as appropriate to the purpose or task to be described.

3.1.1 Title/Status

Each procedure is given a title descriptive of the work or subject it addresses, and includes a revision number and/or date and an approval status.

3.1.1.1 Purpose/Statement of Applicability/Scope

The purpose for which the procedure is intended is clearly stated (if not clear from the title). The systems, structures, components, processes or conditions to which the procedure applies are also clearly described.

3.1.1.2 References

Applicable references, including reference to appropriate Technical Specifications, are required. References are included within the body of the procedure when the sequence of steps requires other tasks to be performed (according to the reference) prior to or concurrent with a particular step.

3.1.1.3 Prerequisites/Initial Conditions

Prerequisites/initial conditions identify those independent actions or procedures that must be accomplished and plant conditions which must exist prior to performing the procedure. A prerequisite applicable to only a specific portion of a procedure is so identified.

3.1.1.4 Precautions

Precautions alert the user to those important measures to be used to protect equipment and personnel, including the public, or to avoid an abnormal or emergency situation during performance of the procedure. Cautionary notes applicable to specific steps are included in the main body of the procedure and are identified as such.

3.1.1.5 Limitations and actions

Limitations on the parameters being controlled and appropriate corrective measures to return the parameter to the normal control band are specified.

3.1.1.6 Main body

The main body of the procedure contains the step-by-step instructions in the degree of detail necessary for performing the required function or task.

3.1.1.7 Acceptance criteria

The acceptance criteria provide the quantitative or qualitative criteria against which the success or failure (as of a test-type activity) of the step or action would be judged.

Insert 2 (Continued)

3.1.1.8 Checklists

Complex procedures utilize checklists which may be included as part of the procedure or appended to it.

3.2 Procedure Types

3.2.1 Administrative Control Procedures

These include administrative procedures, directives, policies, standards, and similar documents that control the programmatic aspects of facility activities. These administrative documents ensure that the requirements of regulatory and license commitments are implemented. Several levels of administrative controls are applied ranging from those affecting the entire Company to those prepared at the implementing group level. These documents establish responsibilities, interfaces, and standard methods (rules of practice) for implementing programs. In addition to the administrative controls described throughout this QAPD, instructions governing the following activities are provided:

3.2.1.1 Operating Orders/Procedures

Instructions of general and continuing applicability to the conduct of business to the plant staff are provided. Examples where these are applied include, but are not limited to, job turnover and relief, designation of confines of control room, definition of duties of operators and others, transmittal of operating data to management, filing of charts, limitations on access to certain areas and equipment, shipping and receiving instructions. Provisions are made for periodic review and updating of these documents, where appropriate.

3.2.1.2 Special Orders

Management instructions, which have short-term applicability and require dissemination, are issued to encompass special operations, housekeeping, data taking, publications and their distribution, plotting process parameters, personnel actions, or other similar matters. Provisions are made for periodic review, updating, and cancellation of these documents, where appropriate.

3.2.1.3 Plant Security and Visitor Control

Procedures or instructions are developed to supplement features and physical barriers designed to control access to the plant and, as appropriate, to vital areas within the plant. Information concerning specific design features and administrative provisions of the plant security program is confidential and thus accorded limited distribution. The security and visitor control procedures consider, for example, physical provisions, such as: fences and lighting; lock controls for doors, gates and compartments containing sensitive equipment; and provisions for traffic and access control. Administrative provisions, such as: visitor sign-in and sign-out procedures; escorts and badges for visitors; emphasis on inspection, observation and challenging of strangers by operating crews; and a program of preemployment screening for potential employees are also considered.

Insert 2 (Continued)

3.2.1.4 Temporary Procedures

Temporary procedures may be used to direct operations during testing, refueling, maintenance, and modifications to provide guidance in unusual situations not within the scope of the normal procedures. These procedures ensure orderly and uniform operations for short periods when the plant, a system, or a component of a system is performing in a manner not covered by existing detailed procedures or has been modified or extended in such a manner that portions of existing procedures do not apply. Temporary Procedures include designation of the period of time during which they may be used and are subject to the procedure review process as applicable.

3.2.2 Engineering Procedures

These documents provide instructions for the preparation of engineering documents, engineering analysis, and implementation of engineering programs. This includes activities such as designs; calculations; fabrication, equipment, construction, and installation specifications; drawings; analysis and topical reports; and testing plans or procedures. They include appropriate references to industry codes and standards, design inputs, and technical requirements.

3.2.3 Installation Procedures

These documents provide instructions for the installation of components generally related to new construction and certain modification activities. They include appropriate reference to industry standards, installation specifications, design drawings, and supplier and technical manuals for the performance of activities. These documents include provisions, such as hold or witness points, for conducting and recording results of required inspections or tests. These documents may include applicable inspection and test instructions subject to the requirements for test and inspection procedures below.

3.2.4 System Procedures

These documents contain instructions for energizing, filling, venting, draining, starting up, shutting down, changing modes of operation, and other instructions appropriate for operations of systems related to the safety of the plant. Actions to correct off-normal conditions are invoked following an operator observation or an annunciator alarm indicating a condition which, if not corrected, could degenerate into a condition requiring action under an emergency procedure. Separate procedures may be developed for correcting off-normal conditions for those events where system complexity may lead to operator uncertainty. Appropriate procedures will also be developed for the fire protection program.

3.2.5 Start-up Procedures

These documents contain instructions for starting the reactor from cold or hot conditions and establishing power operation. This includes documented determination that prerequisites have been met, including confirmation that necessary instruments are operable and properly set; valves are properly aligned, necessary system procedures, tests and calibrations have been completed; and required approvals have been obtained.

Insert 2 (Continued)

3.2.6 Shutdown Procedures

These documents contain guidance for operations during controlled shutdown and following reactor trips, including instructions for establishing or maintaining hot shutdown/standby or cold shutdown conditions, as applicable. The major steps involved in shutting down the plant are specified, including instructions for such actions as monitoring and controlling reactivity, load reduction and cooldown rates, sequence for activating or deactivating equipment, requirements for prompt analysis for causes of reactor trips or abnormal conditions requiring unplanned controlled shutdowns, and provisions for decay heat removal.

3.2.7 Power Operation and Load Changing Procedures

These documents contain instructions for steady-state power operation and load changing. These type documents include, as examples, provisions for use of control rods, chemical shim, coolant flow control, or any other system available for short-term or long-term control of reactivity, making deliberate load changes, responding to unanticipated load changes, and adjusting operating parameters.

3.2.8 Process Monitoring Procedures

These documents contain instructions for monitoring performance of plant systems to assure that core thermal margins and coolant quality are maintained in acceptable status at all times, that integrity of fission product barriers is maintained, and that engineered safety features and emergency equipment are in a state of readiness to keep the plant in a safe condition if needed. Maximum and minimum limits for process parameters are appropriately identified. Operating procedures address the appropriate nature and frequency of this monitoring.

3.2.9 Fuel Handling Procedures

These documents contain instructions for core alterations, accountability of fuel and partial or complete refueling operations that include, for example, continuous monitoring of neutron flux throughout core loading, periodic data recording, audible annunciation of abnormal flux increases, and evaluation of core neutron multiplication to verify safety of loading increments. Procedures are also provided for receipt and inspection of new fuel, and for fuel movements in the spent fuel storage areas. Fuel handling procedures include prerequisites to verify the status of systems required for fuel handling and movement; inspection of replacement fuel and control rods; designation of proper tools, proper conditions for spent fuel movement, proper conditions for fuel cask loading and movement; and status of interlocks, reactor trip circuits and mode switches. These procedures provide requirements for refueling, including proper sequence, orientation and seating of fuel and components, rules for minimum operable instrumentation, actions for response to fuel damage, verification of shutdown margin, communications between the control room and the fuel handling station, independent verification of fuel and component locations, criteria for stopping fuel movements, and documentation of final fuel and component serial numbers (or other unique identifiers) and locations.

Insert 2 (Continued)

3.2.10 Maintenance Procedures

These documents contain instructions in sufficient detail to permit maintenance work to be performed correctly and safely, and include provisions, such as hold or witness points, for conducting and recording results of required inspections or tests. These documents may include applicable inspection or test instructions subject to the requirements for test and inspection procedures below. Appropriate referencing to other procedures, standards, specifications, or supplier manuals is provided. When not provided through other documents, instructions for equipment removal and return to service, and applicable radiation protection measures (such as protective clothing and radiation monitoring) will be included. Additional maintenance procedure requirements are addressed in NQA-1-1994, Subpart 2.18, Section 2.2, Procedures.

3.2.11 Radiation Control Procedures

These documents contain instructions for implementation of the radiation control program requirements necessary to meet regulatory commitments, including acquisition of data and use of equipment to perform necessary radiation surveys, measurements and evaluations for the assessment and control of radiation hazards. These procedures provide requirements for monitoring both external and internal exposures of employees, utilizing accepted techniques; routine radiation surveys of work areas; effluent and environmental monitoring in the vicinity of the plant; radiation monitoring of maintenance and special work activities, and for maintaining records demonstrating the adequacy of measures taken to control radiation exposures to employees and others.

3.2.12 Calibration and Test Procedures

These documents contain instructions for periodic calibration and testing of instrumentation and control systems, and for periodic calibration of measuring and test equipment used in activities affecting the quality of these systems. These documents provide for meeting surveillance requirements and for assuring measurement accuracy adequate to keep safety-related parameters within operational and safety limits.

3.2.13 Chemical and Radiochemical Control Procedures

These documents contain instructions for chemical and radiochemical control activities and include: the nature and frequency of sampling and analyses; instructions for maintaining coolant quality within prescribed limits; and limitations on concentrations of agents that could cause corrosive attack, foul heat transfer surfaces, or become sources of radiation hazards due to activation. These documents also provide for the control, treatment and management of radioactive wastes, and control of radioactive calibration sources.

3.2.14 Emergency Operating Procedures

These documents contain instructions for response to potential emergencies so that a trained operator will know in advance the expected course of events that will identify an emergency and the immediate actions that are taken in response. Format and content of emergency procedures are based on NUREG and Owner's Group(s) guidance that identify potential emergency conditions and require such procedures to include, as appropriate, a title, symptoms to aid in identification of the nature of the emergency, automatic actions to be expected from protective systems, immediate operator actions for operation of controls or confirmation of automatic actions, and subsequent operator actions to return the reactor to a normal condition or provide for a safe extended shutdown period under abnormal or emergency conditions.

3.2.15 Emergency Plan Implementing Procedures

These documents contain instructions for activating the Emergency Response Organization and facilities, protective action levels, organizing emergency response actions, establishing necessary communications with local, state and federal agencies, and for periodically testing the procedures, communications and alarm systems to assure they function properly. Format and content of such procedures are such that requirements of each facility's NRC approved Emergency Plan are met.

3.2.16 Test and Inspection Procedures

These documents provide the necessary measures to assure quality is achieved and maintained for the nuclear facilities. The instructions for tests and inspections may be included within other procedures, such as installation and maintenance procedures, but will contain the objectives, acceptance criteria, prerequisites for performing the test or inspection, limiting conditions, and appropriate instructions for performing the test or inspection, as applicable. These procedures also specify any special equipment or calibrations required to conduct the test or inspection and provide for appropriate documentation and evaluation by responsible authority to assure test or inspection requirements have been satisfied. Where necessary, hold or witness points are identified within the procedures and require appropriate approval for the work to continue beyond the designated point. These procedures provide for recording the date, identification of those performing the test or inspection, as-found condition, corrective actions performed (if any), and as-left condition, as appropriate for the subject test or inspection.

SECTION 4 CONTROL OF SYSTEMS AND EQUIPMENT IN THE OPERATIONAL PHASE

Permission to release systems and equipment for maintenance or modification is controlled by designated operating personnel and documented. Measures, such as installation of tags or locks and releasing stored energy, are used to ensure personnel and equipment safety. When entry into a closed system is required, Fermi 3 has established control measures to prevent entry of extraneous material and to assure that foreign material is removed before the system is reclosed. Administrative procedures require the designated operating personnel to verify that the system or equipment can be released and determine the length of time it may be out of service. In making this determination, attention is given to the potentially degraded degree of protection where one subsystem of a redundant safety system is not available for service. Conditions to be considered in preparing equipment for maintenance include, for example: shutdown margin; method of emergency core cooling; establishment of a path for decay heat removal; temperature and pressure of the system; valves between work and hazardous material; venting, draining and flushing; entry into closed vessels; hazardous atmospheres; handling hazardous materials; and electrical hazards.

When systems or equipment are ready to be returned to service, designated operating personnel control placing the items in service and document its functional acceptability. Attention is given to restoration of normal conditions, such as removal of jumpers or signals used in maintenance or testing, or actions such as returning valves, breakers or switches to proper start-up or operating positions from "test" or "manual" positions. Where necessary, the equipment placed into service receives additional surveillance during the run-in period.

Independent verifications, where appropriate, are used to ensure that the necessary measures have been implemented correctly. The minimum requirements and standards for using independent verification are established in company documents.

SECTION 5 PLANT MAINTENANCE

Fermi 3 establishes controls for the maintenance or modification of items and equipment subject to this QAPD to ensure quality at least equivalent to that specified in original design bases and requirements, such that safety-related structures, systems and components are maintained in a manner that assures their ability to perform their intended safety function(s). Maintenance activities (both corrective and preventive) are scheduled and planned so as not to unnecessarily compromise the safety of the plant.

In establishing controls for plant maintenance, Fermi 3 commits to compliance with NQA-1-1994, Subpart 2.18, with the following clarifications:

- Where Subpart 2.18 refers to the requirements of ANS-3.2, it shall be interpreted to mean the applicable standards and requirements established within the Fermi 3 QAPD
- Section 2.3 requires cleanliness during maintenance to be in accordance with Subpart 2.1. The commitment to Subpart 2.1 is described in the Fermi 3 QAPD, Part II, Section 13.2.