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

10 CFR 52.79

November 4, 2009
NRC3-09-0036

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 R. Hale (USNRC) to Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 13 Related to the SRP Sections 2.3.4, 2.3.5, 9.5.1, 13.1.1, 13.1.2, 13.1.2-3, and 13.2.1 for the Fermi 3 Combined License Application," dated September 22, 2009.

Subject: Detroit Edison Company Response to NRC Request for Additional Information Letter No. 13

In the referenced letter, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). The responses to those Requests for Additional Information (RAIs) are provided in the attachments to this letter.

Information contained in these responses will be incorporated into a future COLA submission as described in the RAI response.

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 4th day of November 2009.

Sincerely,

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

D095
NRO

Attachments:
1) Response to RAI Letter No. 13 (Question No. 3364, 09.05.01-2)
   Response to RAI Letter No. 13 (Question No. 3452, 13.01.02-13.01.03-3)
2) Response to RAI Letter No. 13 (Question No. 3452, 13.01.02-13.01.03-4)
3) Response to RAI Letter No. 13 (Question No. 3612, 13.01.01-3)
4) Response to RAI Letter No. 13 (Question No. 3612, 13.01.01-4)
5) Response to RAI Letter No. 13 (Question No. 3612, 13.01.01-5)
   Response to RAI Letter No. 13 (Question No. 3615, 13.01.02-13.01.03-2)
6) Response to RAI Letter No. 13 (Question No. 3612, 13.01.01-6)
7) Response to RAI Letter No. 13 (Question No. 3612, 13.01.01-7)
8) Response to RAI Letter No. 13 (Question No. 3613, 13.02.01-1)
9) Response to RAI Letter No. 13 (Question No. 3615, 13.01.02-13.01.03-1)
10) Response to RAI Letter No. 13 (Question No. 3693, 02.03.04-1)
11) Response to RAI Letter No. 13 (Question No. 3694, 02.03.05-1)

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

Attachment 1
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3364)
(eRAI Tracking No. 3452)

RAI Question No. 09.05.01-2
RAI Question No. 13.01.02-13.01.03-3

NRC RAIs

The following RAIs involve related topics. To avoid unnecessary duplication and achieve as much simplification as possible, Detroit Edison has elected to address these RAIs with a single response.

A. 09.05.01-2

RG 1.206, Regulatory Position C.III.1, Section C.I.9.5.1.1 identifies that the COL applicant should provide information on the fire protection operational program. RG 1.189, Section 1.6.4.1 states that the brigade leader should be competent to assess the potential safety consequences of a fire and advise control room personnel and such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant systems. The staff requests that the COL applicant provide clarification of the specific training, knowledge and competence of the fire brigade leader, as discussed in Section 13.1.2.1.5, to ensure that the fire brigade leaders qualifications are in conformance with RG 1.189, Section 1.6.4.1.

B. 13.01.02-13.01.03-3

It is unclear from FSAR Section 13.1.2.1.5 whether or not the fire brigade for Fermi 3 is separate and distinct from the Fire Brigade for Fermi 2. Fermi 2 and Fermi 3 are meant to be separate units with no sharing of buildings or systems. If the intent is to provide one fire brigade for both units the applicant is asked to provide further information justifying the appropriateness of using one fire brigade shift to cover both units. Include justification on staff manning, organization, training on diverse units, which equipment will be shared and which will be co-located, and performance-criteria for responding to fires in each unit. If the fire brigade for Fermi 3 is intended to be separate and distinct from the fire brigade for Fermi 2, revise the FSAR to clarify this point.

Response

A. The fire brigade leader will have sufficient training in, or knowledge of, plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The fire brigade leader will have the training or experience necessary to assess the potential safety consequences of a fire and advise control room personnel, as evidenced by possession of an operator's license, or equivalent knowledge of plant systems. The qualification of a fire brigade leader will include an annual physical examination to determine the individual's ability to perform strenuous firefighting activities.

   Detroit Edison will also require at least two fire brigade members to meet the training and knowledge requirements of the fire brigade leader. In addition, all fire brigade members will be subject to the annual physical examination requirement that is applicable to the fire brigade leader.

B. The fire brigade for Fermi 3 will be separate and distinct from the fire brigade for Fermi 2.

Proposed COLA Revision

FSAR Section 13.1.2.1.5 will be revised to clarify Fermi 3 and Fermi 2 fire brigade independence and to address the training, knowledge, and competence requirements for the fire brigade leader and members, as shown on the attached FSAR markup.

Markup of Detroit Edison COLA
(Following page)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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.

necessary for safe shutdown of the unit, nor do they include any other personnel required for other essential functions during a fire emergency. Fire brigade members for a shift are designated in accordance with established procedures at the beginning of the shift. The fire brigade for Fermi 3 does include personnel assigned to Fermi 2.

not

13.1.3 Qualification Requirements of Nuclear Plant Personnel

13.1.3.1 Minimum Qualification Requirements

EF3 COL 13.1-1-A

Qualifications of managers, supervisors, operators, and technicians of the operating organization meet the requirements for education and experience described in ANSI/ANS-3.1 (Reference 13.1-201), as endorsed and amended by RG 1.8. For operators and SROs, these requirements are modified in Section 13.2.

13.1.3.2 Qualification Documentation

Resumes and other documentation of qualification and experience of initial appointees to appropriate management and supervisory positions are available for review by regulators upon request after position vacancies are filled.

13.1.4 COL Information

13.1-1-A Organizational Structure

EF3 COL 13.1-1-A

This COL item is addressed in Subsection 9.5.1.15.3, Subsection 13.1.1 through Subsection 13.1.3.

References

13.1-201 American Nuclear Society, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plant," ANSI/ANS -3.1.

13.1-202 U.S. Nuclear Regulatory Commission, "Generic Letter 86-04, Policy Letter, Engineering Expertise on Shift."

(Insert new paragraph)
The brigade leader and at least two brigade members have sufficient training in, or knowledge of, plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The brigade leader has training or experience necessary to assess the potential safety consequences of a fire and advise control room personnel, as evidenced by possession of an operator's license or equivalent knowledge of plant systems. The qualification of fire brigade members includes an annual physical examination to determine their ability to perform strenuous firefighting activities.

Attachment 2
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3452)

RAI Question No. 13.01.02-13.01.03-4

NRC RAI 13.01.02-13.01.03-4

Describe the educational and training requirements for the Functional Manager in Charge of Fire Protection as described in FSAR Section 13.1.2.1.1.14. RG 1.189 Section 1.6.1a states in part: "A fire protection engineer (or a consultant) who is a graduate of an engineering curriculum of accepted standing and satisfies the eligibility requirements as a Member grade (or Professional Member grade) in the Society of Fire Protection Engineers (SFPE), or is a graduate of an engineering curriculum of accepted standing and is a licensed professional fire protection engineer in the state in which the plant is located, should be a member of the organization responsible for the formulation and implementation of the FPP." If the Functional Manager in Charge of Fire Protection does not meet the above requirements, who within the organization responsible for the formulation and implementation of the FPP will?

Response

Consistent with Regulatory Guide 1.189 and ESBWR DCD 9.5.1.15.4.3, the Functional Manager in Charge of Fire Protection will be a graduate of an engineering curriculum of accepted standing who satisfies the eligibility requirements as a Member grade (or Professional Member grade) in the Society of Fire Protection Engineers (SFPE), or a graduate of an engineering curriculum of accepted standing and a licensed professional fire protection engineer in the state of Michigan.

Proposed COLA Revision

FSAR Section 13.1.2.1.1.14 will be revised to clarify functional manager qualification requirements as shown on the attached FSAR markup.

Markup of Detroit Edison COLA
(Following page)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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.

delegated authority commensurate with the responsibilities of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.

The Functional Manager in Charge of Fire Protection, will meet the requirements of the Fire Protection Engineer as described in DCD Section 9.5.1.15.4.3.

13.1.2.1.2 Operations Department

All operations activities are conducted with safety of personnel, the public, and equipment as the overriding priority. The operations department is responsible for:

- Operation of station equipment
- Monitoring and surveillance of safety- and non-safety-related equipment
- Fuel loading
- Providing the nucleus of emergency and fire-fighting teams

The operations department maintains sufficient licensed and senior licensed operators to staff the control room continuously using a crew rotation system. The operations department is under the authority of the manager in charge of operations who, through the supervisor in charge of shift operations, directs the day-to-day operation of the plant.

Specific duties, functions, and responsibilities of key shift members are discussed in Subsection 13.1.2.1.2.4 through Subsection 13.1.2.1.2.8 and in plant administrative procedures and the Technical Specifications. The minimum shift manning requirements are shown in Table 13.1-202.

For activities that do not require an operator's license, resources of the operations organization may be shared between units. These activities may include administrative functions and tagging. To operate or supervise the operation of more than one unit, an operator (SRO or RO) must hold an appropriate, current license for each unit. See Table 13.1-201 for expected staffing of the operations department, and Table 13.1-202 for minimum shift staffing.

The Operations Support Section is staffed with sufficient personnel to provide support activities for the operating shifts and overall operations department. The following is an overview of the operations organization.

13.1.2.1.2.1 Operations Manager

The operations manager has overall responsibility for the day-to-day operation of the plant. The operations manager reports to the plant manager and is assisted by the supervisors of shift operations,

Attachment 3
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Response to RAI Letter No. 13
(eRAI Tracking No. 3612)

RAI Question No. 13.01.01-3

NRC RAI 13.01.01-3

Standard Review Plan Section 13.1.1, "Management and Technical Support Organization," section I.1.B.iii states the applicant should describe the development of the plant maintenance programs. FSAR section 13.1 does not appear to include a description of the development of the plant maintenance programs.

Please identify the location of this information in the Enrico Fermi 3 COL application, or justify its exclusion.

NOTE: RAI #3344, issued earlier asks a similar question regarding organizational description, structure, functional responsibilities, levels of authority and interfaces, both onsite and offsite.

Response

Detroit Edison responded to RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009. Details of Detroit Edison's organizational description, structure, functional responsibilities, levels of authority and interfaces, were provided in the cited RAI response. Further clarification of the development of plant maintenance programs is warranted. FSAR Section 13.1.2.1.1.5 will be revised to clarify that development of plant maintenance programs is the responsibility of the maintenance manager.

Proposed COLA Revision

FSAR Section 13.1.2.1.1.5 will be revised as shown on the attached markup.

Markup of Detroit Edison COLA
(Following page)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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 Maintenance Manager is responsible for the development of maintenance programs.

The manager in charge of plant maintenance is responsible for the performance of preventive and corrective maintenance and modification activities required to support operations, including compliance with applicable standards, codes, specifications, and procedures. The maintenance manager reports to the plant manager and provides direction and guidance to the maintenance discipline functional managers and maintenance support staff.

13.1.2.1.1.6 Maintenance Discipline Functional Managers

The functional managers of each maintenance discipline (mechanical, electrical, instrumentation and control, and support) are responsible for maintenance activities within their discipline including plant modifications. They provide guidance in maintenance planning and craft supervision. They establish the necessary manpower levels and equipment requirements to perform both routine and emergency type maintenance activities, seeking the services of others in performing work beyond the capabilities of the plant maintenance group. Each discipline functional manager is responsible for liaison with other plant staff organizations to facilitate safe operation of the station. These functional managers report to the maintenance manager.

13.1.2.1.1.7 Maintenance Discipline Supervisors

The maintenance discipline supervisors and assistant supervisors (mechanical, electrical, and instrumentation and control) supervise maintenance activities, assist in the planning of future maintenance efforts, and guide the efforts of the craft within their discipline. The maintenance discipline supervisors report to the appropriate maintenance discipline functional managers.

13.1.2.1.1.8 Maintenance Mechanics, Electricians, and Instrumentation and Control Technicians

The discipline craft perform electrical and mechanical maintenance and I&C tasks as assigned by the discipline supervisors. They troubleshoot, inspect, repair, maintain, and modify plant equipment and perform Technical Specification surveillances on equipment for which they have cognizance. They perform these tasks in accordance with approved procedures and work packages.

Attachment 4
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3612)

RAI Question No. 13.01.01-4

NRC RAI 13.01.01-4

Standard Review Plan Section 13.1.1, "Management and Technical Support Organization," section I.1.B.viii states that the applicant should provide a description of the design and construction and preoperational responsibilities and how the applicant's management interfaces with the NSSS and AE organizations. FSAR section 13.1 does not appear to include a description of the interfaces with the NSSS and AE organizations.

Please identify the location of this information in the Enrico Fermi 3 COL application, or justify its exclusion.

NOTE: RAI #3344, issued earlier asks a similar question regarding organizational description, structure, functional responsibilities, levels of authority and interfaces, both onsite and offsite.

Response

Detroit Edison responded to RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009. The Detroit Edison design, construction, and preoperational responsibilities and interfaces are described in markups to FSAR Chapter 13 and Chapter 17 provided in Attachment 5 of NRC3-09-0027. These markups include clarification of NSSS and A/E functions, discussed in the Fermi 3 QAPD, Part 2, Sections 1.2.5 and 1.2.6, and the reporting relationships shown in Fermi 3 QAPD Figure II.1-2. FSAR Section 13.1 refers to Appendix 13AA and FSAR Chapter 17 for design and construction responsibilities and management interfaces. The Engineering, Procurement, and Construction (EPC) contractor will manage the NSSS and A/E contractor roles as shown in Fermi 3 QAPD Figure II.1-2 markups. The EPC Executive will report to Detroit Edison Senior Vice President, Major Enterprise Projects as discussed in markups to FSAR 13AA.1.9 and shown in Fermi 3 QAPD Figure II.1-2 markups.

Proposed COLA Revision

None. See markups provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-027 (ML092790561), dated September 30, 2009.

Attachment 5
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3612)
(eRAI Tracking No. 3615)

RAI Question No. 13.01.01-5
RAI Question No. 13.01.02-13.01.03-2

NRC RAIs

The following RAIs involve related topics. To avoid unnecessary duplication and achieve as much simplification as possible, Detroit Edison has elected to address these RAIs with a single response.

A. 13.01.01-5

Standard Review Plan Section 13.1.1, "Management and Technical Support Organization," section I.1.B.xi states that the applicant should provide a description of the positions that have functional responsibilities in addition to the COL application and the expected proportion of time these personnel are assigned to the other activities. FSAR section 13.1 does not appear to include the expected proportion of time these personnel assigned to the other activities.

Please identify the location of this information in the Enrico Fermi 3 COL application, or justify its exclusion.

B. 13.01.02-13.01.03-2

Standard Review Plan Section 13.1.2 – 13.1.3, "Operating Organization," section I.2.F asks that, if the stations contain, or there are plans that it contain power generating facilities other than those specified in the application and including fossil-fueled units, the applicant should describe interfaces with the organizations operating the other facilities. The description should include any proposed sharing of personnel between the units, a description of their duties, and the proportion of their time they will routinely be assigned to nonnuclear units. Figure 13.1-201 illustrates the construction organization.

Show where an illustration depicting this information for the operating organization be found in the Enrico Fermi 3 application, or justify its exclusion..

NOTE: RAI #3344, issued earlier asks a similar question regarding organizational description, structure, functional responsibilities, levels of authority and interfaces, both onsite and offsite.

Response

A. *Standard Review Plan Section 13.1.1, "Management and Technical Support Organization," section I.1.B.xi states that the applicant should provide a description of the positions that have functional responsibilities in addition to the COL application and the expected proportion of time these personnel are assigned to the other activities. FSAR section 13.1 does not appear to include the expected proportion of time these personnel assigned to the other activities.*

   Please identify the location of this information in the Enrico Fermi 3 COL application, or justify its exclusion.

   A description of the positions that have functional responsibilities in addition to the COL application and the expected proportion of time these personnel are assigned to the other activities will be provided. FSAR Section 13.1.1.1 states "The first priority and responsibility of each member of the nuclear staff throughout the life of the plant is nuclear safety." FSAR Section 13.1.1.2 states "The site executive establishes the organization of managers, functional managers, supervisors, and staff sufficient to perform required functions for support of safe plant operation."

Table 13.1-201 identifies Fermi 3 positions which share responsibilities with other Fermi units, descriptions of those responsibilities are provided in FSAR Chapter 13. The expected proportion of time these personnel are assigned to other activities will be in proportion to the responsibilities of the positions identified, within the requirements of Sections 13.1.1.1 and 13.1.1.2 as noted above. Functional manager positions that are identified as shared positions are expected to allocate time evenly between Fermi 2 and Fermi 3 responsibilities proportionate with related activities; the expected proportion of time associated with Fermi 2 activities is 50%. For all other positions identified as shared, the estimated number of full time equivalents presented in Table 13.1-201 represents an estimate of staff personnel working a full-time work schedule for one year on Fermi 3 activities, and the expected proportion of time associated with other activities for this full time equivalent estimate is zero.

B. *Standard Review Plan Section 13.1.2 – 13.1.3, "Operating Organization," section I.2.F asks that, if the stations contain, or there are plans that it contain power generating facilities other than those specified in the application and including fossil-fueled units, the applicant should describe interfaces with the organizations operating the other facilities. The description should include any proposed sharing of personnel between the units, a description of their duties, and the proportion of their time they will routinely be assigned to nonnuclear units. Figure 13.1-201 illustrates the construction organization.*

Show where an illustration depicting this information for the operating organization be found in the Enrico Fermi 3 application, or justify its exclusion..

NOTE: RAI #3344, issued earlier asks a similar question regarding organizational description, structure, functional responsibilities, levels of authority and interfaces, both onsite and offsite.

Detroit Edison responded to RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009. The Fermi 3 organization chart figures which illustrate the operating organizations supporting the project were included in markups to FSAR Appendix 17AA, "Fermi 3 QAPD", Figure II.1-3 provided in the cited RAI response.

All power generating facilities currently at the Fermi site are operated within Fermi 1 and Fermi 2 programs. There are no plans for future generating facilities at the Fermi site which are not specified in this application. Interfaces with the Fermi 2 organization are defined in the markups to FSAR Chapter 13 and Chapter 17 provided in response to NRC RAI 3344 in Detroit Edison letter (ML092790561) NRC3-09-027, dated September 30, 2009. Markups provided for FSAR Appendix 17AA, "Fermi 3 QAPD", Figure II.1-3 contain the Fermi 3 organizational chart for the operating organization. FSAR Chapter 13 Table 13.1-201 and the Fermi 3 QAPD Figure II.1-3, including markups, define those organizations which share resources between units. Fermi 2 and Fermi 3 interfaces are managed by the Detroit Edison Chief Nuclear Officer. Table 13.1-201 identifies Fermi 3 positions which share responsibilities with Fermi Unit 2, descriptions of those responsibilities are provided in FSAR Chapter 13. The expected proportion of time these personnel are assigned to other activities will be in proportion to the responsibilities of the positions identified, within the requirements of FSAR Sections 13.1.1.1 and 13.1.1.2. Functional manager positions that are identified as shared positions are expected to allocate time evenly between Fermi 2 and Fermi 3 responsibilities proportionate with related activities; the expected proportion of time associated with Fermi 2 activities is 50%. For all other positions identified as shared, the estimated number of full time equivalents presented in Table 13.1-201 represents an estimate of staff personnel working a full-time work schedule for one year on Fermi 3 activities, and the expected proportion of time associated with other activities for this full time equivalent estimate is zero. No interfaces or sharing of resources with Fermi 1 or other nonnuclear power generating units is expected.

Proposed COLA Revision

FSAR Table 13.1-201 will be revised as shown on the attached markup. See markups provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-027 (ML092790561), dated September 30, 2009.

Markup of Detroit Edison COLA
(Following page)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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 13.1-201 Generic Position/Site Specific Position Cross Reference (Sheet 6 of 6) [EF3 COL 13.1-1-A]

Nuclear Function	Function Position (ANS-3.1-1993 section)		Nuclear Plant Position (Site-Specific)	Estimated Numbers of Full Time Equivalents* Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
	supervisor	(4.4.11)	Preop Testing Supervisor		2	2	-
	preop test engineer	(n/a)	Preop Test Engineer		8	8	-

Notes:

* Unless otherwise noted, the number in each block represents the estimated number of full time equivalents dedicated to the project.

** The number in this block indicates total positions in the nuclear organization.

*** ~~Shared position with other Fermi units.~~ Shared positions with Fermi Unit 2. Functional manager positions are expected to allocate time evenly between Fermi 2 and Fermi 3 responsibilities proportionate with related activities. For all other positions, the estimated number of full time equivalents represents an estimate of staff personnel working a full time work schedule for one year on Fermi 3 activities.

**** A senior reactor operator on shift who meets the qualifications for the combined SRO/STA position specified for Option 1 of Generic Letter 86-04 (Reference 13.1-202) may also serve as the STA. If this option is used for a shift, the separate STA position may be eliminated for that shift.

Attachment 6
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3612)

RAI Question No. 13.01.01-6

NRC RAI 13.01.01-6

Standard Review Plan Section 13.1.1, "Management and Technical Support Organization," section I.2.A requests the applicant provide organizational charts of the applicant's corporate level management and technical support organizations. The statement is made in the Enrico Fermi 3 COL application, Section 13.1.1.2, "Management and Technical Support Organization", that "Figures incorporated into Section 17.5 illustrate the management and technical organizations supporting operation of the plant." FSAR Section 17.5 does not appear to include these illustrations.

Please identify the location of this information in the Enrico Fermi 3 COL application, or justify its exclusion.

Response

The Fermi 3 organization chart figures which illustrate the management and technical organizations supporting the project were included in markups to FSAR Chapter 13 and Chapter 17 provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-027 (ML092790561), dated September 30, 2009.

Proposed COLA Revision

None. See markups provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-027 (ML092790561), dated September 30, 2009.

Attachment 7
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3612)

RAI Question No. 13.01.01-7

NRC RAI 13.01.01-7

Standard Review Plan Section 13.1.1, "Management and Technical Support Organization," section I.2 requests the applicant describe the provisions for technical support for operations, give the approximate numbers of and describe educational and experience requirements for, each identified position or class of positions providing technical support for plant operations, and include specific educational and experience requirements for individuals holding the management and supervisory positions in organizational units providing support in the areas identified as items I.2.E – I.2.P.

Please identify the location of information related to the personnel listed in SRP Sections I.2.H and I.2.P in the Enrico Fermi 3 COL application, or justify its exclusion.

Response

The Fermi 3 organization descriptions and charts which illustrate the management and technical organizations supporting the project were included in markups to FSAR Chapter 13 and Chapter 17 provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009.

SRP 13.1.1.I.2.H Fueling and Refueling Operations Support

FSAR Section 13.1.1.2.4 states "The function of fueling and refueling is performed by a combination of personnel from various departments including operations, maintenance, radiation protection, engineering, and reactor technology vendor or other contractor staff." The approximate numbers of full time equivalents assigned to these organizations are described in Table 13.1-201. The educational and experience requirements are discussed in association with each organization identified. FSAR sections 13.1.1.4, 13.1.3.1, and 13AA.2.2 define the ANSI/ANS-3.1 education and experience requirements for Technical Support Personnel, Operations Personnel, and Preoperational and Startup Personnel respectively.

SRP 13.1.1.I.2.P Outside Contractual Assistance

FSAR Section 13.1.1.2 states "In the event that station personnel are not qualified to deal with a specific problem, the services of qualified individuals from other functions within the company or outside consultants are engaged." In this case, the expected number of full time equivalents for outside contractual support is as described in Table 13.1-201, and the experience and educational requirements are as defined for the organizations engaging the contractual support.

FSAR Section 13.1.1.2.12 states "Contract assistance with vendors and outside suppliers is provided by the materials, procurement, and contracts organization." FSAR Section 13.5.1 states "Procedures outline the essential elements of the administrative programs and controls as described in ASME NQA-1 and Section 17.5. ... This includes contractor and owner organizations providing support to the station operating organization." FSAR Section 13AA.1 states "...design and construction activities will be contracted to qualified suppliers of such services. Implementation or delegation of design and construction responsibilities is described in the sections below. Quality Assurance aspects are described in Chapter 17." The NRC

Standard Review Plan Section 13.1.1, section I.1 states "For NSSS and AE organizations with extensive experience, a detailed description of this experience may be provided in lieu of the details of their organization as evidence of technical capability. However, the applicant should describe how this experience will be applied to the project." Contracts for future activities have not been established, in lieu of details of contractor organizations, Detroit Edison has provided a detailed description of the qualification of contractor experience and technical capabilities, as well as a description of how Detroit Edison will apply the contractor experience to the project. As stated in FSAR Chapter 13, all contractor controls are managed per requirements of FSAR Chapter 17 and the Fermi 3 QAPD, which specifies utilization of qualified and technically capable contractors, as well as controls to verify that the appropriate experience is applied to the project, and verification of associated services. The numbers of full time equivalents, the experience, and the education of future contracted services will be controlled via established contractor control requirements within the Fermi 3 QAPD.

Proposed COLA Revision

None. See markups provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009.

Attachment 8
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3613)

RAI Question No. 13.02.01-1

NRC RAI 13.02.01-1

FSAR, Section 13.2, Training, Appendix 13BB, Training Program, incorporates by reference NEI 06-13A, "Technical Report on a Template for an Industry Training Program Description," revision unspecified.

NEI 06-13A, Revision 0, does not address a cold license training program. NEI 06-13A, Revision 1, which addresses a cold license training program, has now been endorsed by the NRC.

DTE Energy letter to USNRC, "Detroit Edison Company Evaluation of North Anna Unit 3 (R-COLA) Responses to NRC Requests for Additional Information," dated February 16, 2009, states that Detroit Edison does not adopt the R-COLA RAI response that incorporated NEI 06-13A, Revision 1. Thus, Appendix 13BB does not address provisions for a cold license training plan.

Explain how Fermi operators will be trained and licensed without a cold license training program.

Response

Detroit Edison letter NRC3-09-009, dated February 16, 2009 refers to an October 10, 2008 Dominion Energy, Inc. letter entitled "Updated Evaluation of R-COLA Responses to NRC Requests for Additional Information (RAIs) for Standard Applicability." In its February 16, 2009 letter (ML090620123) as updated on September 30, 2009 (ML092750406), Detroit Edison indicated its intention to use the R-COLA responses to RAIs classified as "Standard" verbatim in its own responses to those RAIs. The R-COLA Standard Applicability Table classifies RAI 13.02.01-01, relating to NEI 06-13A as "Site Specific". It is important to note that the classification of an RAI by the R-COLA owner cannot be changed by the owners of an S-COLA. As a result, the February Detroit Edison letter would appear to indicate that Detroit Edison has not adopted NEI 06-13A, Revision 1. This is not the case. As noted in FSAR Table 1.6-201 "Referenced Topical Reports," Detroit Edison has committed to NEI 06-13A, Revision 1 for the reference in Appendix 13BB.

For clarity, Appendix 13BB will be modified to include further details of the transition to operations phase in a new FSAR section, 13AA.2.4. The responsibilities of recruiting and training development and implementation of FSAR Section 13AA.2.3 have been assigned to the Senior Vice President Major Enterprise Projects to be consistent with the new section and consistent with the markups provided by Detroit Edison response to RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009.

Proposed COLA Revision

FSAR Appendix 13BB will be revised as shown on the attached markups.

Markup of Detroit Edison COLA
(Following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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.

training provides instruction on the administrative controls of the test program. The startup test program provides data and experience useful during the operational phase.

During the preoperational and startup testing phases, the constructor and reactor vendor staff support, as necessary, the testing performed by the nuclear plant preoperational and startup testing staffs. The functional managers in charge of preoperational and startup testing are assisted by other station organizations including operations, plant maintenance, and engineering. These assisting organizations provide support in developing test procedures, conducting the test program, and in reviewing test results.

Procedures are written to describe organizational responsibilities and interfaces between staff, constructor, and reactor vendor, and to establish direction in writing, reviewing, and performing tests. The construction organization, depicted in Figure 13.1-201, includes the preoperational and startup testing functional groups.

13AA.2.3 Development and Implementation of Staff Recruiting and Training Programs

Senior Vice President, Major Enterprise Projects

Staffing plans are developed with input from the reactor vendor for safe operation of the plant as determined by HFE. See DCD Section 18.6. These plans are developed under the direction and guidance of the ~~site executive, the executive in charge of engineering, and the executive in charge of support.~~ **[START COM 13AA-001]** Staffing plans will be completed and manager level positions filled prior to start of preoperational testing. Personnel selected to be licensed reactor operators and senior reactor operators along with other staff necessary to support the safe operation of the plant are hired with sufficient time available to complete appropriate training programs and become qualified and licensed (if required) prior to fuel being loaded in the reactor vessel. See Figure 13.1-202 for hiring and training requirements for operator and technical staff relative to fuel load. **[END COM 13AA-001]**

Because of the dynamic nature of the staffing plans and changes that occur over time, it is expected that specific numbers of personnel on site will change. Table 13.1-201 includes the initial estimated number of staff for selected positions that will be filled at the time of initial fuel load. Recruiting of personnel to fill positions is the shared responsibility of the manager in charge of human resources and the various heads of departments. The training program is described in Section 13.2.

Appendix 13BB Training Program

STD SUP 13.2-1
STD COL 13.2-1-A
STD COL 13.2-2-A

NEI 06-13A (Reference 13BB-201), Technical Report on a Template for an Industry Training Program Description, which is under review by the NRC staff, is incorporated by reference.

13.BB References

13BB-201 Nuclear Energy Institute (NEI), "Technical Report on a Template for an Industry Training Program Description," NEI 06-13A.

(Insert new section)

13AA.2.4 Transition to Operating Phase

The Senior Vice President, Major Enterprise Projects is responsible for developing and implementing a plan for the organizational transition from the construction phase to the operating phase. The plan is fully implemented and transition completed prior to commencement of commercial operations with operational responsibility then fully under the direction of the Fermi 3 Site Executive.

Attachment 9
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3615)

RAI Question No. 13.01.02-13.01.03-1

NRC RAI 13.01.02-13.01.03-1

Standard Review Plan Section 13.1.2 – 13.1.3, "Operating Organization," section I.2.A states that the applicant should provide an organization chart of the operating organization. In addition, the organization chart should show changes, additions, and what is shared with other units. FSAR section 13.1 does not appear to include an organization chart for the operating organization nor what is shared with other units.

Please identify the location of this information in the Enrico Fermi 3 application or justify its exclusion.

NOTE: RAI #3344, issued earlier asks a similar question regarding organizational description, structure, functional responsibilities, levels of authority and interfaces, both onsite and offsite.

Response

Detroit Edison responded to RAI #3344 in Detroit Edison letter NRC3-09-0027 (ML092790561), dated September 30, 2009. The Fermi 3 organization chart figures which illustrate the operating organizations supporting the project were included in markups to Chapter 17 provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-027 (ML092790561), dated September 30, 2009. Markups provided for FSAR Chapter 17, Appendix 17AA, "Fermi 3 QAPD," Figure II.1-2 contain the Fermi 3 organizational chart for the operating organization. FSAR Chapter 13 Table 13.1-201 and the Fermi 3 QAPD Figure II.1-2, including markups, define those organizations which share resources between units.

Proposed COLA Revision

None. See markups provided in response to NRC RAI #3344 in Detroit Edison letter NRC3-09-027 (ML092790561), dated September 30, 2009.

Attachment 10
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3693)

RAI Question No. 02.03.04-1

NRC RAI 02.03.04-1

The response to Environmental RAI AQ2.7-5 provided a new set of 50% design-basis accident X/Q values for the EAB and LPZ. This new set of X/Q values is the result of defining a circular "power block envelope" centered on the Reactor Building that encompasses all the potential design-basis accident release pathways. The resulting distances to the EAB and LPZ have been reduced, which should result in higher (more conservative) EAB and LPZ X/Q values.

Please revise FSAR Table 2.0-201 and FSAR Section 2.3.4 to present the higher of either the 0.5% maximum sector or 5% overall site X/Q values (pursuant to RG 1.145) resulting from the revised EAB and LPZ distances presented in the response to Environmental RAI AQ2.7-5.

Response

As described in the response to Environmental Report RAI AQ2.7-5 in Detroit Edison letter NRC3-09-013 (ML092400475) dated August 25, 2009, Detroit Edison has recalculated the EAB and outer LPZ boundary distances to account for all possible release source locations. For the purposes of determining X/Q values and subsequent radiation dose analyses, an effective EAB and LPZ are determined; referred to as the Dose Calculation EAB and the Dose Calculation LPZ. A circle is drawn from the center of the Reactor Building that encompasses the postulated design basis accident release locations. The Dose Calculation EAB and LPZ are defined as the distance between this circle and the EAB and LPZ respectively. The Dose Calculation EAB is completely within the actual plant EAB; thus, the X/Q values are higher. The distances are as follows:

Dose Calculation EAB	740 meters
Dose Calculation LPZ	4670 meters

Based on the distances for the Dose Calculation EAB and the Dose Calculation LPZ, the 0.5% maximum sector and the 5% overall site X/Q values were determined. The X/Q values are presented in the following tables.

0.5% Maximum Sector X/Q Values (sec/m^3)

Location	0-2 hours X/Q	0-8 hours X/Q	8-24 hours X/Q	1-4 days X/Q	4-30 days X/Q
Dose Calculation EAB	3.66E-04				
Dose Calculation LPZ		3.23E-05	2.23E-05	9.95E-06	3.13E-06

5% Overall Site X/Q Values (sec/m^3)

Location	0-2 hours X/Q	0-8 hours X/Q	8-24 hours X/Q	1-4 days X/Q	4-30 days X/Q
Dose Calculation EAB	2.54E-04				
Dose Calculation LPZ		2.20E-05	1.57E-05	7.64E-06	2.70E-06

As shown the limiting values are the 0.5% maximum sector X/Q values. The limiting X/Q values at the EAB and LPZ continue to be bounded by the corresponding values in the ESBWR DCD, Revision 5.

Proposed COLA Revision

Attached are mark-ups to FSAR Table 2.0-201 and FSAR Section 2.3.4 to reflect the revised X/Q values.

Markup of Detroit Edison COLA
(Following 7 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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.

Subject (16)	DCD Site Parameter Value(1)(16)	Fermi 3 Site Characteristic	Evaluation
Maximum Settlement Values for Seismic Category I Buildings (continued)			
Maximum Differential Displacement between Reactor/Fuel Buildings and Control Building			
	85 mm (3.3 inches)	9.4 mm (0.37 in)	The Fermi 3 site characteristic value for the maximum differential displacement between the RB/FB foundation and the CB foundation is provided in Table 2.5.4-232 which, as shown, falls within (is less than) the DCD site parameter value.
Meteorological Dispersion (X/Q)(11)			
EAB X/Q			
0–2 hours	2.00E-03 s/m^3	~~2.90E-04~~ 3.66E-04 s/m^3	The site characteristic value for short-term (accident release) atmospheric dispersion for 0–2 hr X/Q value at the EAB is defined as the 0–2 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the EAB. The site characteristic value falls within (is lower than) the DCD site parameter value.
LPZ X/Q			
0–8 hours	1.90E-04 s/m^3	~~6.12E-05~~ 3.23E-05 s/m^3	The site characteristic value for short-term (accident release) atmospheric dispersion for 0–8 hr X/Q value at the LPZ is defined as the 0–8 hour 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.
8–24 hours	1.40E-04 s/m^3	~~2.15E-05~~ 2.23E-05 s/m^3	The site characteristic value for short-term (accident release) atmospheric dispersion for 8–24 hr X/Q value at the LPZ is defined as the 8–24 hour 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
1–4 days	7.50E-05 s/m^3	~~8.52E-06~~ 9.95E-06 s/m^3	The site characteristic value for short-term (accident release) atmospheric dispersion for 1–4 day X/Q value at the LPZ is defined as the 1–4 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.

Subject [16]	DCD Site Parameter Value[1][16]	Fermi 3 Site Characteristic	Evaluation
Meteorological Dispersion (X/Q) (continued)			
4–30 days	3.00E-05 s/m^3	~~2.96E-06~~ s/m^3 3.13E-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 * * 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	1.69E-03 s/m^3	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	1.19E-03 s/m^3	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	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	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	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	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	The Fermi 3 site characteristic value is provided in Table 2.3-303 and falls within (is less than) the DCD site parameter value.

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.

2.3.4.1 Calculation Methodology

The efficiency of diffusion is primarily dependent on winds (speed and direction) and atmospheric stability characteristics.

Relative concentrations of released gases, X/Q values, as a function of direction for various time periods at the EAB and the outer boundary of the LPZ, were determined by the use of the computer program PAVAN, NUREG/CR-2858. This program implements the guidance provided in Regulatory Guide 1.145. The X/Q calculations are based on the theory that material released to the atmosphere are normally distributed (Gaussian) about the plume centerline. A straight-line trajectory is assumed between the point of release and the distances for which X/Q values are calculated in accordance with NUREG/CR-2858 and Regulatory Guide 1.145.

Using joint frequency distributions of wind direction and wind speed by atmospheric stability, PAVAN provides the X/Q values as functions of direction for various time periods at the EAB and the LPZ. The meteorological data needed for this calculation included wind speed, wind direction, and atmospheric stability. The meteorological data used for this analysis was collected from the onsite monitoring equipment from 2002 through 2007. The data was combined and is reported in Table 2.3-292 through Table 2.3-299.

Other plant specific data includes tower height at which wind speed was measured (10 m [32.8 ft]) and distances to the EAB and LPZ. The EAB for Fermi 3 is shown in Figure 2.1-203, which is a circle centered at the Reactor Building with a radius of 892 m (2928 ft). The LPZ for Fermi 3 is a 4828-m (3-mile) radius circle centered at the Reactor Building. ← Insert 1

Regulatory Guide 1.145 divides release configurations into two modes, ground-level release and stack release. Compared to a stack release, a ground-level release usually results in higher ground-level concentrations at downwind receptors due to less dilution from shorter traveling distances. Because the ground-level release scenario provides a bounding case, stack releases were not evaluated.

The PAVAN program computes X/Q values at the EAB and LPZ for each combination of wind speed and atmospheric stability class for each of 16 downwind direction sectors. The X/Q values calculated for each direction sector are then ranked in descending order, and an associated cumulative frequency distribution is derived based on the frequency distribution of wind speeds and stabilities for the complementary upwind direction sector. The X/Q value that is equaled or exceeded 0.5 percent of the total time becomes the maximum sector-dependent X/Q value.

The calculated X/Q values are also ranked independently of wind direction into a cumulative frequency distribution for the entire site. The PAVAN program then selects the X/Qs that are equaled or exceeded 5 percent of the total time.

In accordance with Regulatory Guide 1.145, the larger of the two values (i.e., the maximum sector-dependent 0.5 percent X/Q or the overall site 5 percent X/Q value) is used to represent the X/Q value for a 0-2 hour time period. To determine X/Q values for longer time periods, the program calculates an annual average X/Q value using the procedure described in Regulatory Guide 1.111. The program then uses logarithmic interpolation between the 0-2 hour X/Q values for each sector and the corresponding annual average X/Q values to calculate the values for intermediate time periods (i.e., 0-8 hours, 8-24 hours, 1-4 days, and 4-30 days).

2.3.4.2 Calculations and Results

PAVAN requires the meteorological data in the form of joint frequency distributions of wind direction and wind speed by atmospheric stability class. These analyses were completed using data from the Fermi site meteorological instrumentation collected between 2002 and 2007.

The stability classes were based on the classification system given in Table 2 of Regulatory Guide 1.23. Joint frequency distribution tables were developed from the meteorological data.

Building area is defined as the smallest vertical-plane cross-sectional area of the Reactor Building, in square meters. The area used in the PAVAN input was zero, thereby conservatively neglecting the building 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.

Dose Calculation

Dose Calculation

Table 2.3-300 provides the offsite atmospheric dispersion factors. The PAVAN modeling results for the maximum sector X/Q values at the EAB and the 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:

Insert 2 Here

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

	0-2 hours	0-8 hours	8-24 hours	1-4 days	4-30 days
EAB	2.90E-04	N/A	N/A	N/A	N/A
LPZ	N/A	3.12E-05	2.15E-05	9.52E-06	2.96E-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. 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. 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 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

Insert 1

For the purposes of determining X/Q values, an effective EAB and LPZ are determined. These are referred to as the Dose Calculation EAB and the Dose Calculation LPZ. A circle is drawn from the center of the Reactor Building that encompasses the postulated design basis accident release locations. The Dose Calculation EAB and LPZ are defined as the distance between this circle and the EAB and LPZ, respectively. The distance for the Dose Calculation EAB is 740 meters. The distance for Dose Calculation LPZ is 4670 meters.

Insert 2

	0-2 hours	**0-8 hours**	**8-24 hours**	**1-4 days**	**4-30 days**
Dose Calculation EAB	3.66E-04				
Dose Calculation LPZ	N/A	3.23-06	2.23E-06	9.95E-06	3.13E-06

Table 2.3-300 Fermi 3 Offsite Short-Term Atmospheric Dispersion Factors [EF3 COL 2.0-10-A]

Exclusion Area Boundary χ/Q (sec/m^3)

	Direction Dependent χ/Q		Direction Independent χ/Q
Time Period	**0.5% Max Sector χ/Q**	**Sector/Distance**	**5% Overall Site Limit**
0-2 hrs	~~2.90E-04~~ 3.66E-04	ESE	~~1.99E-04~~ 2.54E-04

Low Population Zone χ/Q (sec/m^3)

	Direction Dependent χ/Q		Direction Independent χ/Q
Time Period	**0.5% Max Sector χ/Q**	**Sector/Distance**	**5% Overall Site Limit**
0-8 hrs	~~3.12E-05~~ 3.23E-05	ESE	~~2.12E-05~~ 2.20E-05
8-24 hrs	~~2.15E-05~~ 2.23E-05	ESE	~~1.51E-05~~ 1.57E-05
1-4 days	~~9.52E-06~~ 9.95E-06	ESE	~~7.30E-06~~ 7.64E-06
4-30 days	~~2.96E-06~~ 3.13E-06	ESE	~~2.56E-06~~ 2.70E-06

Attachment 11
NRC3-09-0036

Response to RAI Letter No. 13
(eRAI Tracking No. 3694)

RAI Question No. 02.03.05-1

NRC RAI 02.03.05-1

The response to Environmental RAI AQ2.7-5 provided a new set of design-basis accident X/Q values for the EAB and LPZ which was the result of defining a circular "power block envelope" centered on the Reactor Building that encompasses all the potential design-basis accident release pathways. The resulting distances to the EAB and LPZ were reduced, which can result in higher (more conservative) EAB and LPZ X/Q values.

Although the ESBWR standard design has three normal operation release pathways to the atmosphere (i.e., the reactor/fuel building, turbine building, and radwaste building ventilation stacks), one set of distances to the site boundary and special receptors of interest was used to model releases from all three pathways. Please revise FSAR Section 2.3.5.1 to explain the methodology used to derive this set of distances to each receptor location. If applicable, justify not using a "power block envelope" concept that encompasses all the normal operation release pathways for determining the distance to each receptor location.

Response

The long term X/Qs are used for determining the radiological impacts due to normal releases from the plant vent stacks. In this case, the ESBWR has three vent stacks; the Reactor Building Vent Stack (RB-VS), the Turbine Building Vent Stack (TB-VS) and the Radwaste Building Vent Stack (RW-VS). Current analysis determined the long term X/Q values based on the distance from the Reactor Building Centerline to the various receptors. The relative location of the three vent stacks is shown on Figure 2A-1 of the ESBWR DCD, Revision 5. The distances from each of the vent stacks to the site boundary in each of the sectors has been estimated. This is an estimation as Figure 2A-1 in the ESBWR DCD, Revision 5, is a sketch of sources and receptors for the ESBWR control room. In order to account for uncertainty as to the actual stack location, a circle was drawn around each stack (25 feet radius). The distances for each stack to the site boundary were determined from the circle around each vent stack. In some cases, the distances from the vent stacks to the various receptors are shorter than the distance from the reactor building to that same receptor.

Long Term X/Q values are used in the following determinations:

1. Comparison of airborne release concentrations at the site boundary (unrestricted area) to 10 CFR 20 (FSAR Table 12.2-17R)

2. Comparison of the dose at the site boundary (unrestricted area) to the design objectives in 10 CFR 50 Appendix I.

3. Determination of the dose to the Maximum Exposed Individual (MEI). The dose to the MEI includes contributions due to residence, garden, animal meat and animal milk.

4. Determination of the total dose to the population within 50 Miles from the Reactor.

The discussion below encompasses each of these four determinations where the long term X/Q values are used.

Airborne Release Concentrations at Site Boundary
In the current analysis, the long term X/Q values for releases from the RB-VS and the TB-VS are not bounded by the corresponding values in the ESBWR DCD, Revision 5. The long term X/Q values for releases from the RW-VS are bounded by the corresponding value in the ESBWR DCD, Revision 5. As not all of the long term X/Q values were bounded by the ESBWR DCD, Revision 5, Detroit Edison provided FSAR Table 12.2-17R for comparison with the site boundary airborne release concentration limits of 10 CFR 20 using the greater of the site specific or ESBWR DCD, Revision 5, X/Q values. Specifically, Table 12.2-17R was developed using the site specific X/Q values for releases from the RB-VS and the TB-VS and the X/Q values for releases from the RW-VS from the ESBWR DCD, Revision 5. The current analysis uses the maximum X/Q calculated at the site boundary for each of the three stacks. This is conservative as the maximum X/Q values are not in the same direction for each of the three stacks.

As noted above, the distances from each of the vent stacks to the site boundary has been estimated based on the relative location shown for each stack on Figure 2A-1 in the ESBWR DCD, Revision 5. For the directions that have the highest X/Q value, as shown in FSAR Tables 2.3-307 through 2.3-309, for the RB-VS and the TB-VS, the estimated distance from the vent stacks is shorter than that previously used to determine the corresponding X/Q value. Thus, the X/Q values for releases are larger. FSAR, Section 2.3.5, Tables 2.3-328 through 2.3-339, provide values for X/Qs at closer distances; i.e., 800 meters. Table 1 shows the distances from each vent stack to the site boundary.

Table 1: Estimated Distances to Site Boundary from Vent Stacks

	Distance to Site Boundary from Each Vent Stack (meters)		
Sector	**RB/FB**	**RW**	**TB**
N	1042	976	1016
NNE	1507	1413	1470
NE	2064	1961	1924
SSE	1109	1191	1221
S	1109	1191	1221
SSW	1134	1218	1249
SW	1413	1494	1560
WSW	1264	1136	1199
W	911	913	1003
WNW	924	863	897
NW	903	845	879
NNW	903	845	879

Using the limiting X/Q values for 800 meters would bound any of the above shown vent stack locations. FSAR Tables 2.3-307 through 2.3-309 show the X/Q value at the site boundary in each sector for each vent stack based on a location at the Reactor Building Centerline. The limiting X/Q values for each vent stack at distance of 800 meters (0.5 mile) to the site boundary will be used to determine the site specific X/Q values. The sector used for the limiting X/Q will be the greater of the previously identified limiting X/Q boundary sector or its adjacent sectors. These limiting X/Q values are shown in Table 2. As discussed in the Note for FSAR Table 2.3-305, the ENE, E, ESE, and SE sectors are not included as these sectors are directly towards Lake Erie.

Table 2: Limiting X/Q Values (sec/m^3) at 800 Meters (0.5 mile)

Vent Stack	Limiting X/Q Value at 800 Meters	Sector	Associated X/Q Value from ESBWR DCD
RW-VS	1.711E-05	SSE	2E-05
RB-VS	6.257E-07	WNW	3E-07
TB-VS	6.935E-07	WNW	2E-07

Similar to the current determinations, the site specific X/Q values for releases from the RB-VS and TB-VS are not bounded by the ESBWR DCD and the site specific X/Q value for releases from the RW-VS is bounded by the ESBWR DCD. The determination of the airborne release concentrations in Table 12.2-17R has been updated using the limiting X/Q values at 800 meters for the RB-VS and TB-VS. As discussed above, using the 800 meter distance is conservative relative to the identified vent stack locations. This determination shows that the airborne release concentrations are less than the limits in 10 CFR 20. The FSAR will be updated to reflect the airborne release concentrations in Table 12.2-17R are based on X/Q values corresponding to a distance of 800 meters from the release points to the site boundary.

Maximum Exposed Individual Dose Projections

The doses to the maximum exposed individual (MEI) from the gaseous pathway are shown on FSAR Table 12.2-18bR and Table 12.2-201. The contributions to the dose are identified for the following:

- Plume exposure at the Site Boundary
- Ground exposure at nearest residence
- Consumption of vegetables from nearest Vegetable Garden
- Consumption of meat from nearest Meat Cow
- Inhalation at nearest residence
- Consumption of milk from nearest Milk Goat
- Consumption of milk from nearest Milk Cow

For plume exposure at the site boundary, as shown in FSAR Table 12.2-18bR, the limiting site boundary location, determined based on the dose, is the SSE direction. The distance from the Fermi 3 Reactor Building centerline to the site boundary in the SSE direction is 1131 meters. The estimated distances from the circle around each of the specific stacks to the site boundary in the SSE direction are shown in the following Table.

Table 3: Distances to Site Boundary in SSE Direction From Each Vent Stack

Stack	Distance to SSE Site Boundary (meters)
RB-VS	1109
TB-VS	1191
RW-VS	1221

As shown in Table 3, the distance from the TB-VS and the RW-VS to the site boundary in the SSE direction is greater than the distance from the Reactor Building to the site boundary, and the distance from the RB-VS to the site boundary in the SSE direction is less than the distance from the Reactor Building to the site boundary. ESBWR DCD Table 12.2-16 identifies the source term that is released from each of the vent stacks. Review of the source term, indicates that more of the release is from the TB-VS and RW-VS than from the RB-VS; this is especially true for the noble gas and iodine radionuclides. Coupled with the conservatisms for the TB-VS and the RW-VS distances to the site boundary in the SSE direction, it can be concluded that the current overall dose due to the plume shown in FSAR Table 12.2-18bR and Table 12.2-201 are conservative. As shown in FSAR Table 12.2-201, the predicted exposure is well within the limits in 10 CFR 50.

As shown in FSAR Table 12.2-18bR, the total dose to the MEI is determined by summing all of the various contributors. This is very conservative as the meat cow, milk goat and milk cow are not located at the same locations are none of these are located at the closest residence/closest vegetable garden.

For exposure from the other contributors, the possible receptors were conservatively modeled. Table 4 shows the distance used in the analysis vs. the actual distance from the Reactor Building Centerline.

Table 4: Comparison of Distances to Receptors

Receptor	Analysis Distance(1)	Actual Distance from Reactor Building Centerline(2)
Ground Exposure	919 meters	1107 meters (NW)
Vegetable Garden	919 meters	1110 meters (NW)
Meat Cow	919 meters	4904 meters (NNW)
Inhalation	919 meters	1107 meters (NW)
Milk Goat	3704 meters	3704 meters (WNW)
Milk Cow	3513 meters	3513 meters (WNW)

(1) Analysis distances are shown in FSAR Table 12.2-18bR in WNW Direction
(2) Actual distances are shown in FSAR Tables 2.3-305 and 2.3-306

The exposure is related to the atmospheric dispersion factors (X/Qs) and the deposition factors (D/Qs). As shown in NRC Regulatory Guide 1.111, X/Q and D/Q values are inversely related to the distance from the source to the receptor. As the distance increases the associated X/Q and D/Q values decrease. As the distance decreases the associated X/Q and D/Q values increase. The greater the relative change in distance, the greater the change in the associated X/Q and D/Q values.

Table 1 shows the distance from the circle around each vent stack to the site boundary. The closest distance from the circle around the vent stacks to the site boundary in the WNW, NW, and NNW directions is 845 meters (RW-VS); or 74 meters less than that used to determine the X/Q values used in the dose analysis.

As shown in Table 4, the actual distance used in the analysis for the milk goat and the milk cow are the same as the distance used in the analysis. Thus, the reduction in distance by 74 meters will result in a small increase to the X/Q and D/Q values. The increase of the X/Q and D/Q values will be relatively small as the relative change in distance is small. That is the change in distance is approximately 2% (i.e., 74 / 3513).

As shown in Table 4, the actual distance for the ground exposure, vegetable garden, inhalation and meat cow are greater than the distance used in the analysis. The difference between the actual distance and the distance used in the analysis for these receptors is greater than 74 meters. For the ground exposure and inhalation, the difference between the actual distance and the distance used in the analysis is 188 meters. For the vegetable garden, the difference between the actual distance and the distance used in the analysis is 191 meters. For the meat cow, the difference between the actual distance and the distance used in the analysis is 3985 meters. After considering the 74 meter decrease in distance due to the stack vs. RB release location, the margin provided to the actual receptor location is still greater than 100 meters for the limiting receptor (i.e., 188 – 74 = 114 meters). Thus, the actual distance exceeds the analysis distance by more than 100 meters after accounting for the off-set between the stack location and the Reactor Building centerline. The 100 meter margin would result in a decrease in the associated X/Q and D/Q values. The 100 meters is approximately 9% (100 / 1107) of the total distance to the closest receptor.

The 9% margin due to the 100 meters difference between the actual distance and the analysis distance after accounting for the stack location more than off-sets the 2% non-conservatism discussed above pertaining to the goat and cow milk. In addition, as shown in FSAR Table 12.2-18bR, the most significant contribution to the total gaseous pathway dose to the MEI is the contribution from the vegetable garden; i.e., 11.7 mrem/year of a total 14.2 mrem/year. As shown in Table 4, above, the dose due to the vegetable garden is analyzed at the closer distance.

As discussed previously, the total dose to the MEI presented in FSAR Table 12.2-18bR determines the total exposure assuming that all of these potential sources contribute to the total dose to the MEI. NRC R.G. 1.109, Table 1, indicates that organ dose from these pathways is evaluated at a location where an exposure pathway and dose receptor actually exist. As shown in FSAR Table 12.2-18bR, the cow milk, goat milk and meat cow are located more than a mile away from the closest residence with the vegetable garden. Thus, including these contributions in the total dose to the MEI is conservative in that these sources are not located near each other. This conservatism will more than compensate for non-conservatism in the determination of the contribution from the goat milk and cow milk.

Therefore, for determining the dose to the MEI, the current long term X/Q values are considered to be acceptable.

Population Dose Projections

The total population dose is determined based on the population within 50 miles of the site and applying standard usage factors. Consistent with NRC RG 1.109, Appendix D, Section 2.b, the 50 mile region is divided into sub-regions from the center of the facility. The X/Q values are evaluated at the radial midpoint for each of the sub-regions. Consistent with other regulatory guidance (e.g., NUREG-1555, Section 5.4.1, Section II, Technical Rationale) the population within the affected area based on the distance from the reactor. Therefore, using the distance from the Reactor Building Centerline is acceptable for performing the population dose projections.

In conclusion, the approach taken for determining the distances for the long term X/Q analyses is considered to be conservative.

Proposed COLA Revision

Attached is a markup for FSAR Section 2.3.5 to clarify that the distances used for determining the long term atmospheric dispersion factors are based on the centerline of the Reactor Building.

Attached is a mark-up for FSAR Section 12.2 to reflect determining the airborne concentrations based on X/Q values corresponding to a distance of 800 meters from the release points to the site boundary.

Markup of Detroit Edison COLA
(Following 15 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next submittal of the Fermi 3 COLA Revision 2. 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.

Fermi 2 and Fermi 3 was conservatively assumed (actual distance is approximately 421 m [1381 ft]). The release height and receptor height were both assumed to be 10m (32.8 ft). The methodology uses a "safety factor" of 1.5 to account for any variations in release locations.

EF3 COL 2.0-11-A

2.3.5 Long-Term (Routine) Diffusion Estimates

For a routine release, the concentration of radioactive material in the surrounding region depends on the amount of effluent released, the height of the release, the momentum and buoyancy of the emitted plume, the wind speed, atmospheric stability, airflow patterns of the site, and various effluent removal mechanisms. Annual average relative concentration, X/Q, and annual average relative deposition, D/Q, for gaseous effluent routine releases were, therefore, calculated.

2.3.5.1 Calculation Methodology and Assumptions

The XOQDOQ computer program, NUREG/CR-2919, which implements the assumptions outlined in Regulatory Guide 1.111, was used to generate the annual average relative concentration, X/Q, and annual average relative deposition, D/Q. Values of X/Q and D/Q were determined at the site boundary, at points of maximum individual exposure, and at points within a radial grid of sixteen 22.5 degree sectors and extending to a distance of 80 km (50 mi). Radioactive decay and dry deposition were considered.

Meteorological data from 2002 through 2007 was used in the analysis. Receptor locations were based on the site boundary in each of the 16 directions as well as the nearest residences, gardens, sheep, goat, meat cow, and milk cow receptor locations in each of the 16 directions based on 2005 through 2007 Land Use Census. Meteorological data in joint frequency distributions format consistent with the Fermi 3 short-term (accident) diffusion X/Q calculation discussed above was utilized.

For this analysis, both ground-level and mixed-mode releases were considered. A ground-level release was considered for releases from the Radwaste Building, while mixed-mode releases were considered for releases from the Reactor Building/Fuel Building Stack and the Turbine Building Stack based on the criteria set forth in Regulatory Guide 1.111. At ground-level locations beyond several miles from the plant, the annual average concentration of effluents are essentially independent of release mode; however, for ground-level concentrations within a few miles, the release mode is important. Gaseous effluents released from tall stacks generally produce peak ground-level air concentrations near or beyond the site boundary. Near ground-level releases usually produce concentrations that decrease from the release point to locations downwind. Guidance for selection of the release mode is provided in Regulatory Guide 1.111.

The following input data and assumptions are used in the analysis:

- Meteorological data: 6-year (2002-2007) composite onsite joint frequency distributions of wind speed, wind direction, and atmospheric stability
- Type of release: Ground-level (Radwaste Building Stack); mixed-mode (Reactor Building/Fuel Building and Turbine Building Stacks)
- Wind sensor height: 10 m
- Vertical temperature difference: between 10 m to 60 m
- Number of wind speed categories: 9
- Release height: 10 m (default height) for ground-level release; 52.62 m for Reactor Building/Fuel Building Stack (mixed-mode); 71.30 m for Turbine Building Stack (mixed-mode)
- Building area: 350 m^2 for ground-level release, conservatively set to zero to neglect the building wake credit for the mixed-mode releases
- Adjacent building height: N/A for ground-level release; 48.05 m for Reactor Building/Fuel Building Stack (mixed-mode); 52.0 m for Turbine Building Stack (mixed-mode)
- Average Vent Velocity: N/A for ground-level release; 17.78 m/s for Reactor Building/Fuel Building Stack (mixed-mode); 17.78 m/s for Turbine Building Stack (mixed-mode)
- Inside Vent Diameter: N/A for ground-level release; 2.40 m for Reactor Building/Fuel Building Stack (mixed-mode); 1.95 m for Turbine Building Stack (mixed-mode)
- Distances from release point to site boundary, nearest residence, nearest garden, neatest sheep, nearest goat, nearest meat cow, and nearest milk cow for all downwind sectors

Insert 3

- Dry deposition is considered for all releases
- Continuous release is assumed

Insert 3

The distances are determined from the centerline of the Reactor Building.

release source term. These source terms are provided in DCD Table 12.2-16. Design basis noble gas, iodine, and other fission product concentrations are taken from the tables in DCD Chapter 11. Specific details and information on the derivation of the airborne source terms are provided in DCD Appendix 12B.

Annual Releases

Insert 4

Based upon the above criteria, the normal operating source terms are given in DCD Table 12.2-16 and a comparison to 10 CFR 20 criteria is given in Table 12.2-17R. This table also shows the maximum activity concentration for each nuclide at the site boundary from combined operation of Fermi 2 and Fermi 3, and the corresponding concentration limit from 10 CFR 20, Appendix B, Table 2, Column 1.

12.2.2.2 **Airborne Dose Evaluation Offsite**

Replace this section with the following.

EF3 COL 12.2-2-A

The bases for the calculation of Fermi 3-specific airborne offsite doses are provided in Table 12.2-18aR. The annual gaseous pathway doses are provided in Table 12.2-18bR. The methodology in RG 1.109 was used in determining the annual airborne dose values. The bases include values that are default parameters in RG 1.109 and other values that are Fermi 3 site-specific inputs. As part of the analysis, several sensitivities were performed to account for potentially limiting combinations of atmospheric dispersion, deposition and ingestion pathways. The SSE direction provides the limiting plume dose. The WNW direction at the site boundary provides the limiting dose for non-milk iodine and particulate sources. This is conservative relative to the doses at the actual residences, vegetable gardens and meat cows. The WNW direction at the actual locations provides the dose contribution due to milk consumption. In this case the cow and goat milk are both included for conservatism. The total dose is the sum of these individual pathways.

The results of the Fermi 3 gaseous pathway dose analysis are given in Table 12.2-18bR.

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit (Sheet 1 of 5)

[EF3 COL 12.2-2-A]

Insert 5

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Kr-83m	8.5E+01	2.3E-03	1.3E-06	3.6E-17	3.6E-12	5.00E-05	7.2E-08
Kr-85m	6.6E+05	1.8E+01	1.1E-02	3.1E-13	1.4E-10	1.00E-07	1.4E-03
Kr-85	5.2E+06	1.4E+02	9.1E-02	2.4E-12	2.1E-11	7.00E-07	3.1E-05
Kr-87	1.4E+06	3.9E+01	2.5E-02	6.8E-13	3.0E-12	2.00E-08	1.5E-04
Kr-88	2.1E+06	5.6E+01	3.6E-02	9.8E-13	5.4E-11	9.00E-09	6.0E-03
Kr-89	1.4E+07	3.7E+02	6.4E-01	1.7E-11	9.6E-11	1.00E-09	9.6E-02
Xe-131m	1.5E+05	4.1E+00	2.6E-03	7.1E-14	5.8E-12	2.00E-06	2.9E-06
Xe-133m	1.9E+02	5.2E-03	3.0E-06	8.2E-17	2.4E-12	6.00E-07	4.0E-06
Xe-133	4.1E+07	1.1E+03	3.8E+00	1.0E-10	1.1E-09	5.00E-07	2.1E-03
Xe-135m	2.2E+07	6.0E+02	7.8E+00	2.1E-10	2.1E-10	4.00E-08	5.3E-03
Xe-135	2.8E+07	7.5E+02	4.4E+00	1.2E-10	1.4E-10	7.00E-08	2.0E-03
Xe-137	2.8E+07	7.6E+02	1.7E+00	4.5E-11	6.8E-11	1.00E-09	6.8E-02
Xe-138	2.3E+07	6.3E+02	4.3E-01	1.2E-11	1.1E-10	2.00E-08	5.5E-03
I-131	8,4E+03	2.3E-01	3.5E-04	9.6E-15	2.1E-14	2.00E-10	1.0E-04
I-132	5.8E+04	1.6E+00	2.8E-03	7.7E-14	1.8E-13	2.00E-08	8.8E-06
I-133	4.2E+04	1.1E+00	2.1E-03	5.6E-14	1.3E-13	1.00E-09	1.3E-04

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit (Sheet 2 of 5) [EF3 COL 12.2-2-A]

Nuclide	Fermi 3 Annual Release MBq/yr	Fermi 3 Annual Release Ci/yr	Fermi 3 Concentration Bq/m^3	Fermi 3 Concentration µCi/ml	Fermi 2 + 3 Concentration µCi/ml	10 CFR 20 Concentration Limit µCi/ml	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
I-134	1.1E+05	3.0E+00	5.2E-03	1.4E-13	3.3E-13	6.00E-08	5.5E-06
I-135	5.9E+04	1.6E+00	2.9E-03	7.9E-14	1.9E-13	6.00E-09	3.1E-05
H-3	2.8E+06	7.6E+01	4.4E-02	1.2E-12	1.3E-12	1.00E-07	1.3E-05
C-14	5.3E+05	1.4E+01	9.2E-03	2.5E-13	2.5E-13	3.00E-09	8.3E-05
Na-24	5.4E+00	1.5E-04	8.6E-08	2.3E-18	2.3E-18	7.00E-09	3.3E-10
P-32	1.3E+00	3.5E-05	2.1E-08	5.6E-19	5.6E-19	5.00E-10	1.1E-09
Ar-41	1.4E+03	3.8E-02	2.4E-05	6.6E-16	6.6E-16	1.00E-08	6.6E-08
Cr-51	1.8E+02	4.7E-03	1.3E-05	3.6E-16	3.6E-16	3.00E-08	1.2E-08
Mn-54	1.5E+02	4.1E-03	6.2E-05	1.7E-15	1.7E-15	1.00E-09	1.7E-06
Mn-56	1.1E+01	3.0E-04	1.7E-07	4.7E-18	4.7E-18	2.00E-08	2.4E-10
Fe-55	4.7E+01	1.3E-03	7.5E-07	2.0E-17	2.0E-17	3.00E-09	6.7E-09
Fe-59	2.0E+01	5.4E-04	4.8E-06	1.3E-16	1.3E-16	5.00E-10	2.6E-07
Co-58	4.0E+01	1.1E-03	3.6E-06	9.8E-17	9.8E-17	1.00E-09	9.8E-08
Co-60	3.2E+02	8.7E-03	1.1E-04	3.0E-15	3.0E-15	5.00E-11	6.0E-05
Ni-63	4.7E+02	1.3E-06	7.5E-10	2.0E-20	2.0E-20	1.00E-09	2.0E-11
Cu-64	6.9E+00	1.9E-04	1.1E-07	3.0E-18	3.0E-18	3.00E-08	9.8E-11

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit (Sheet 3 of 5)

[EF3 COL 12.2-2-A]

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Zn-65	3.2E+02	8.6E-03	9.6E-06	2.6E-16	2.6E-16	4.00E-10	6.5E-07
Rb-89	2.0E-01	5.4E-06	3.2E-09	8.6E-20	8.6E-20	2.00E-07	4.3E-13
Sr-89	1.5E+02	3.9E-03	2.5E-06	6.8E-17	7.2E-16	2.00E-10	3.6E-06
Sr-90	1.0E+00	2.7E-05	1.7E-08	4.7E-19	4.9E-17	6.00E-12	8.2E-06
Y-90	8.1E-02	2.2E-06	1.3E-09	3.5E-20	3.5E-20	9.00E-10	3.9E-11
Sr-91	6.7E+00	1.8E-04	1.1E-07	2.9E-18	1.4E-14	5.00E-09	2.8E-06
Sr-92	4.6E+00	1.2E-04	7.3E-08	2.0E-18	2.2E-14	9.00E-09	2.4E-06
Y-91	1.7E+00	4.6E-05	2.7E-08	7.3E-19	7.3E-19	2.00E-10	3.6E-09
Y-92	3.7E+00	1.0E-04	5.9E-08	1.6E-18	1.6E-18	1.00E-08	1.6E-10
Y-93	7.2E+00	1.9E-04	1.1E-07	3.1E-18	3.1E-18	3.00E-09	1.0E-09
Zr-95	4.4E+01	1.2E-03	1.2E-05	3.4E-16	3.4E-16	4.00E-10	8.6E-07
Nb-95	2.4E+02	6.5E-03	3.9E-06	1.0E-16	1.0E-16	2.00E-09	5.2E-08
Mo-99	1.7E+03	4.5E-02	2.7E-05	7.2E-16	5.3E-15	2.00E-09	2.7E-06
Tc-99m	2.2E+00	5.9E-05	3.5E-08	9.4E-19	5.7E-14	2.00E-07	2.9E-07
Ru-103	1.0E+02	2.8E-03	1.6E-06	4.4E-17	4.8E-17	9.00E-10	5.3E-08
Rh-103m	3.5E-03	9.5E-08	5.5E-11	1.5E-21	1.5E-21	2.00E-06	7.5E-16
Ru-106	1.4E-01	3.8E-06	2.2E-09	6.0E-20	6.0E-20	2.00E-11	3.0E-09

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit (Sheet 4 of 5)

[EF3 COL 12.2-2-A]

Nuclide	Fermi 3 Annual Release MBq/yr	Fermi 3 Annual Release Ci/yr	Fermi 3 Concentration Bq/m^3	Fermi 3 Concentration µCi/ml	Fermi 2 + 3 Concentration µCi/ml	10 CFR 20 Concentration Limit µCi/ml	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Rh-106	4.5E-06	1.2E-10	7.1E-14	1.9E-24	1.9E-24	1.00E-09	1.9E-15
Ag-110m	1.0E-01	2.8E-06	1.6E-09	4.4E-20	4.4E-20	1.00E-10	4.4E-10
Sb-124	5.3E+00	1.4E-04	1.1E-06	3.1E-17	3.1E-17	3.00E-10	1.0E-07
Te-129m	1.6E+00	4.3E-05	2.5E-08	6.8E-19	6.8E-19	3.00E-10	2.3E-09
Te-131m	5.5E-01	1.5E-05	8.7E-09	2.4E-19	2.4E-19	1.00E-09	2.4E-10
Te-132	1.4E-01	3.8E-06	2.2E-09	6.0E-20	1.0E-15	9.00E-10	1.1E-06
Cs-134	1.8E+02	4.9E-03	3.8E-05	1.0E-15	1.1E-15	2.00E-10	5.3E-06
Cs-136	1.5E+01	4.0E-04	2.4E-07	6.5E-18	3.0E-17	9.00E-10	3.3E-08
Cs-137	2.7E+02	7.3E-03	6.4E-05	1.7E-15	1.8E-15	2.00E-10	8.8E-06
Cs-138	8.5E-01	2.3E-05	1.3E-08	3.6E-19	3.1E-14	8.00E-08	3.9E-07
Ba-140	7.8E+02	2.1E-02	1.3E-05	3.5E-16	2.2E-15	2.00E-09	1.1E-06
La-140	1.3E+01	3.5E-04	2.1E-07	5.6E-18	5.6E-18	2.00E-09	2.8E-09
Ce-141	2.6E+02	7.1E-03	4.7E-06	1.3E-16	1.3E-16	8.00E-10	1.7E-07
Ce-144	1.3E-01	3.5E-06	2.1E-09	5.6E-20	7.3E-18	2.00E-11	3.6E-07
Pr-144	1.6E-04	4.3E-09	2.5E-12	6.8E-23	6.8E-23	2.00E-07	3.4E-16
W-187	1.3E+00	3.5E-05	2.1E-08	5.6E-19	5.6E-19	1.00E-08	5.6E-11

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit (Sheet 5 of 5)

[EF3 COL 12.2-2-A]

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	**MBq/yr**	**Ci/yr**	**Bq/m^3**	**µCi/ml**	**µCi/ml**	**µCi/ml**	
Np-239	8.3E+01	2.2E-03	1.3E-06	3.6E-17	4.9E-14	3.00E-09	1.6E-05
Total (w/ H-3)	1.7E+08	4.6E+03	1.9E+01	5.1E-10	1.9E-09		1.9E-01
Total (w/o H-3)	1.7E+08	4.5E+03	1.9E+01	5.1E-10	1.9E-09		1.9E-01

Insert 4:

For determining the maximum activity concentration at the site boundary, the site specific X/Q values from each vent stack are conservatively assumed to be 800 meters (0.5 mile) from the site boundary.

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Kr-83m	8.5E+01	2.3E-03	1.7E-06	4.6E-17	3.6E-12	5.0E-05	7.2E-08
Kr-85m	6.6E+05	1.8E+01	1.4E-02	3.9E-13	1.4E-10	1.0E-07	1.4E-03
Kr-85	5.2E+06	1.4E+02	1.1E-01	3.1E-12	2.2E-11	7.0E-07	3.2E-05
Kr-87	1.4E+06	3.9E+01	3.2E-02	8.6E-13	3.2E-12	2.0E-08	1.6E-04
Kr-88	2.1E+06	5.6E+01	4.6E-02	1.2E-12	5.4E-11	9.0E-09	6.0E-03
Kr-89	1.4E+07	3.7E+02	7.0E-01	1.9E-11	9.8E-11	1.0E-09	9.8E-02
Xe-131m	1.5E+05	4.1E+00	3.3E-03	8.9E-14	5.8E-12	2.0E-06	2.9E-06
Xe-133m	1.9E+02	5.2E-03	3.8E-06	1.0E-16	2.4E-12	6.0E-07	4.0E-06
Xe-133	4.1E+07	1.1E+03	4.0E+00	1.1E-10	1.1E-09	5.0E-07	2.1E-03
Xe-135m	2.2E+07	6.0E+02	7.8E+00	2.1E-10	2.1E-10	4.0E-08	5.3E-03
Xe-135	2.8E+07	7.5E+02	4.5E+00	1.2E-10	1.4E-10	7.0E-08	2.1E-03
Xe-137	2.8E+07	7.6E+02	1.8E+00	4.8E-11	7.1E-11	1.0E-09	7.1E-02
Xe-138	2.3E+07	6.3E+02	5.4E-01	1.5E-11	1.1E-10	2.0E-08	5.7E-03
I-131	8.4E+03	2.3E-01	3.9E-04	1.1E-14	2.2E-14	2.0E-10	1.1E-04
I-132	5.8E+04	1.6E+00	3.1E-03	8.3E-14	1.8E-13	2.0E-08	9.2E-06

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	μCi/ml	μCi/ml	μCi/ml	
I-133	4.2E+04	1.1E+00	2.3E-03	6.1E-14	1.4E-13	1.0E-09	1.4E-04
I-134	1.1E+05	3.0E+00	5.6E-03	1.5E-13	3.4E-13	6.0E-08	5.7E-06
I-135	5.9E+04	1.6E+00	3.2E-03	8.6E-14	2.0E-13	6.0E-09	3.3E-05
H-3	2.8E+06	7.6E+01	5.5E-02	1.5E-12	1.6E-12	1.0E-07	1.6E-05
C-14	5.3E+05	1.4E+01	1.2E-02	3.2E-13	3.2E-13	3.0E-09	1.1E-04
Na-24	5.4E+00	1.5E-04	1.1E-07	2.9E-18	2.9E-18	7.0E-09	4.1E-10
P-32	1.3E+00	3.5E-05	2.6E-08	7.0E-19	7.0E-19	5.0E-10	1.4E-09
Ar-41	1.4E+03	3.8E-02	3.1E-05	8.3E-16	8.3E-16	1.0E-08	8.3E-08
Cr-51	1.8E+02	4.7E-03	1.4E-05	3.8E-16	3.8E-16	3.0E-08	1.3E-08
Mn-54	1.5E+02	4.1E-03	6.2E-05	1.7E-15	1.7E-15	1.0E-09	1.7E-06
Mn-56	1.1E+01	3.0E-04	2.2E-07	5.9E-18	5.9E-18	2.0E-08	2.9E-10
Fe-55	4.7E+01	1.3E-03	9.3E-07	2.5E-17	2.5E-17	3.0E-09	8.4E-09
Fe-59	2.0E+01	5.4E-04	4.8E-06	1.3E-16	1.3E-16	5.0E-10	2.6E-07
Co-58	4.0E+01	1.1E-03	3.8E-06	1.0E-16	1.0E-16	1.0E-09	1.0E-07
Co-60	3.2E+02	8.7E-03	1.1E-04	3.0E-15	3.0E-15	5.0E-11	6.0E-05
Ni-63	4.7E-02	1.3E-06	9.3E-10	2.5E-20	2.5E-20	1.0E-09	2.5E-11

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Cu-64	6.9E+00	1.9E-04	1.4E-07	3.7E-18	3.7E-18	3.0E-08	1.2E-10
Zn-65	3.2E+02	8.6E-03	1.1E-05	3.0E-16	3.0E-16	4.0E-10	7.4E-07
Rb-89	2.0E-01	5.4E-06	4.0E-09	1.1E-19	1.1E-19	2.0E-07	5.4E-13
Sr-89	1.5E+02	3.9E-03	3.2E-06	8.6E-17	7.4E-16	2.0E-10	3.7E-06
Sr-90	1.0E+00	2.7E-05	2.2E-08	5.9E-19	5.0E-17	6.0E-12	8.3E-06
Y-90	8.1E-02	2.2E-06	1.6E-09	4.3E-20	4.3E-20	9.0E-10	4.8E-11
Sr-91	6.7E+00	1.8E-04	1.3E-07	3.6E-18	1.4E-14	5.0E-09	2.8E-06
Sr-92	4.6E+00	1.2E-04	9.1E-08	2.5E-18	2.2E-14	9.0E-09	2.4E-06
Y-91	1.7E+00	4.6E-05	3.4E-08	9.1E-19	9.1E-19	2.0E-10	4.6E-09
Y-92	3.7E+00	1.0E-04	7.3E-08	2.0E-18	2.0E-18	1.0E-08	2.0E-10
Y-93	7.2E+00	1.9E-04	1.4E-07	3.9E-18	3.9E-18	3.0E-09	1.3E-09
Zr-95	4.4E+01	1.2E-03	1.3E-05	3.4E-16	3.5E-16	4.0E-10	8.7E-07
Nb-95	2.4E+02	6.5E-03	4.8E-06	1.3E-16	1.3E-16	2.0E-09	6.5E-08
Mo-99	1.7E+03	4.5E-02	3.3E-05	9.0E-16	5.5E-15	2.0E-09	2.8E-06
Tc-99m	2.2E+00	5.9E-05	4.4E-08	1.2E-18	5.7E-14	2.0E-07	2.9E-07
Ru-103	1.0E+02	2.8E-03	2.0E-06	5.5E-17	5.9E-17	9.0E-10	6.5E-08
Rh-103m	3.5E-03	9.5E-08	6.9E-11	1.9E-21	1.9E-21	2.0E-06	9.4E-16
Ru-106	1.4E-01	3.8E-06	2.8E-09	7.5E-20	7.5E-20	2.0E-11	3.8E-09

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Rh-106	4.5E-06	1.2E-10	8.9E-14	2.4E-24	2.4E-24	1.0E-09	2.4E-15
Ag-110m	1.0E-01	2.8E-06	2.0E-09	5.5E-20	5.5E-20	1.0E-10	5.5E-10
Sb-124	5.3E+00	1.4E-04	1.2E-06	3.1E-17	3.1E-17	3.0E-10	1.0E-07
Te-129m	1.6E+00	4.3E-05	3.2E-08	8.6E-19	8.6E-19	3.0E-10	2.9E-09
Te-131m	5.5E-01	1.5E-05	1.1E-08	2.9E-19	2.9E-19	1.0E-09	2.9E-10
Te-132	1.4E-01	3.8E-06	2.8E-09	7.5E-20	1.0E-15	9.0E-10	1.1E-06
Cs-134	1.8E+02	4.9E-03	3.8E-05	1.0E-15	1.1E-15	2.0E-10	5.4E-06
Cs-136	1.5E+01	4.0E-04	3.0E-07	8.2E-18	3.1E-17	9.0E-10	3.5E-08
Cs-137	2.7E+02	7.3E-03	6.4E-05	1.7E-15	1.8E-15	2.0E-10	8.9E-06
Cs-138	8.5E-01	2.3E-05	1.7E-08	4.6E-19	3.1E-14	8.0E-08	3.9E-07
Ba-140	7.8E+02	2.1E-02	1.6E-05	4.4E-16	2.3E-15	2.0E-09	1.2E-06
La-140	1.3E+01	3.5E-04	2.6E-07	7.0E-18	7.0E-18	2.0E-09	3.5E-09
Ce-141	2.6E+02	7.1E-03	5.8E-06	1.6E-16	1.7E-16	8.0E-10	2.1E-07
Ce-144	1.3E-01	3.5E-06	2.6E-09	7.0E-20	7.3E-18	2.0E-11	3.6E-07
Pr-144	1.6E-04	4.3E-09	3.2E-12	8.6E-23	8.6E-23	2.0E-07	4.3E-16
W-187	1.3E+00	3.5E-05	2.6E-08	7.0E-19	7.0E-19	1.0E-08	7.0E-11
Np-239	8.3E+01	2.2E-03	1.6E-06	4.5E-17	4.9E-14	3.0E-09	1.6E-05
Total (w/ H-3)	1.7E+08	4.6E+03	2.0E+01	5.3E-10	1.9E-09		1.9E-01

	Fermi 3 Annual Release		Fermi 3 Concentration		Fermi 2 + 3 Concentration	10 CFR 20 Concentration Limit	Fermi 2 + 3 Fraction of 10 CFR 20 Limit
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Total (w/o H-3)	1.7E+08	4.5E+03	2.0E+01	5.3E-10	1.9E-09		1.9E-01