PMFermiCOLPEm Resource

From: Pal, Amar
Sent: Wednesday, September 16, 2009 3:01 PM
To: FermiCOL Resource
Subject: FW: RAI Letter 6 For Your Review
Attachments: NRC3-09-0011%20Letter[1].pdf

From: Pal, Amar
Sent: Thursday, August 27, 2009 2:20 PM
To: 'rxk@eri-world.com'
Subject: FW: RAI Letter 6 For Your Review

From: Tonacci, Mark
Sent: Thursday, August 27, 2009 1:58 PM
To: Pal, Amar
Cc: FermiCOL Resource; Hale, Jerry
Subject: RAI Letter 6 For Your Review

This letter just came in a few minutes ago.

Mark Tonacci
Senior Project Manager
Division of New Reactor Licensing
ESBWR/ABWR Licensing Branch
301-415-4045

Hearing Identifier: Fermi_COL_Public
Email Number: 615

Mail Envelope Properties (DC2088DF7F51A8499309AA4A35D0C1E01EE682854F)

Subject: FW: RAI Letter 6 For Your Review
Sent Date: 9/16/2009 3:00:59 PM
Received Date: 9/16/2009 3:01:07 PM
From: Pal, Amar

Created By: Amar.Pal@nrc.gov

Recipients:
"FermiCOL Resource" <FermiCOL.Resource@nrc.gov>
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DTE Energy Company
2000 2nd Ave., Detroit, MI 48226-1279

DTE Energy

10 CFR 52.79

August 26, 2009
NRC3-09-0011

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

References:
1) Fermi 3
   Docket No. 52-033
2) Letter from Jerry Hale (USNRC) to Peter W. Smith (Detroit Edison), "Request for Additional Information Letter No. 6 Related to the SRP Section 08.2 for the Fermi 3 Combined License Application, Revision 1," dated July 8, 2009
3) Letter from Jack M. Davis (DTE Energy) to USNRC, "Detroit Edison Company Response to NRC Request for Additional Information Letter No. 3," NRC3-09-0003, dated March 25, 2009
4) Letter from Jack M. Davis (DTE Energy) to USNRC, "Detroit Edison Company Application for a Combined License for Fermi 3 – Submission 2," NRC3-09-0006, dated March 25, 2009

Subject: Detroit Edison Company Response to NRC Request for Additional Information Letter No. 6

In Reference 2, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). The responses to the following Requests for Additional Information (RAIs) are provided as Attachments 1 through 13 of this letter:

- RAI Question 08.02-1 Single Failure of Offsite Transmission
- RAI Question 08.02-2 Separate Transmission Systems
- RAI Question 08.02-3 Grid Reliability

- RAI Question 08.02-4 — Galloping Conductor Phenomena
- RAI Question 08.02-5 — Lightning Protection
- RAI Question 08.02-6 — Battery and Battery Charger Testing
- RAI Question 08.02-7 — Submergence of Low Voltage Power Cables
- RAI Question 08.02-8 — Switchyard Voltage Limits
- RAI Question 08.02-9 — Switchyard Components Testing and Inspection
- RAI Question 08.02-10 — Tech Spec Reference
- RAI Question 08.02-11 — Maintenance Rule
- RAI Question 08.02-12 — Protective Relaying Location
- RAI Question 08.02-13 — Switchyard Transformer Protection Location

Information contained in these responses will be incorporated into the next appropriate update of the Fermi 3 COLA.

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 26th day of August, 2009.

Sincerely,

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

Attachments:
1) Response to RAI Letter No. 6 (Question No. 08.02-1)
2) Response to RAI Letter No. 6 (Question No. 08.02-2)
3) Response to RAI Letter No. 6 (Question No. 08.02-3)
4) Response to RAI Letter No. 6 (Question No. 08.02-4)
5) Response to RAI Letter No. 6 (Question No. 08.02-5)
6) Response to RAI Letter No. 6 (Question No. 08.02-6)
7) Response to RAI Letter No. 6 (Question No. 08.02-7)
8) Response to RAI Letter No. 6 (Question No. 08.02-8)
9) Response to RAI Letter No. 6 (Question No. 08.02-9)
10) Response to RAI Letter No. 6 (Question No. 08.02-10)
11) Response to RAI Letter No. 6 (Question No. 08.02-11)
12) Response to RAI Letter No. 6 (Question No. 08.02-12)
13) Response to RAI Letter No. 6 (Question No. 08.02-13

cc:
Jack M. Davis, Senior Vice President and Chief Nuclear Officer
Mark Tonacci, NRC Fermi 3 Project Manager
Stephen Lemont, 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
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-1

NRC RAI 08.02-1

FSAR Section 8.2.2.3.1 states: "There are no single failures that can prevent the Fermi offsite power system from performing its function to provide power to EF3." Failure mode and effect analysis of the towers indicates that structural failure of one tower could affect power distribution of the neighboring tower. The staff notes that all three transmission lines are routed in a common corridor for 29.4 miles. Provide justification that a failure of one tower could not propagate and cause the failure of the third tower lines in the same offsite power transmission corridor. Justification should include the separation distances between the three transmission towers along with the height of each tower, and associated drawings.

Response

In Fermi 3 FSAR Section 8.2.2.3.1, the reference to the design meeting the single failure criterion concerns the offsite power system. As is stated in ESBWR DCD Section 8.1.2.2 and discussed in detail below, the transmission system is not included in the offsite power system design.

Fermi 3 FSAR Section 8.2.2.3.2 describes the effects of failures in the proposed transmission system design and states that the failure of any one 345 kV tower or pole due to structural failure can at most disrupt and cause the loss of power distribution to itself and the adjacent line, if one is present. It is the intent to meet this criterion in the design of the transmission system, however, the design of the Fermi 3 switchyard and transmission lines from the Fermi 3 switchyard to the Milan Substation is presently at the conceptual design stage. State regulations require that the approval of the Michigan Public Service Commission (MPSC) be obtained for the routing of the transmission lines prior to proceeding with construction. As such, details as to the design of transmission towers and separation distances of towers throughout the transmission corridor are not available (and will likely not be available until well after Fermi 3 is scheduled to receive its combined operating license).

ITC*Transmission* will design the new transmission lines using their present design practices, as described in Section 8.2.1.1 of the Fermi 3 FSAR. These design practices have been found to be satisfactory for the conditions in the area.

Conformance with the General Design Criteria (GDC) does not depend on the design of the transmission lines from the Fermi 3 switchyard to the Milan Substation. The ESBWR design does not rely on power from the transmission system to permit functioning of structures, systems and components to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. Therefore, the underlying purpose of GDC 17 is met by the Fermi 3 transmission system design without the need for independent transmission system circuits.

The Fermi 3 offsite power system is not safety related. Therefore it is not relied upon to remain functional during and following design basis events to assure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in 10 CFR 50.34(a)(1) or 10 CFR 100.11.

The General Design Criteria (GDC) described in 10 CFR 50, Appendix A, provides guidance for the design of certain structures, systems and components associated with nuclear power plants. Specifically, GDC 17 applies to the design of electric power systems. It should be noted that in the introduction to the GDCs, the NRC recognizes that the GDCs were developed based upon the designs of plants licensed at that time (i.e., non-passive plants). The GDCs are considered to be generally applicable to other types of plants and are intended to provide principal design criteria for such plants. As principal design criteria, the GDCs establish the necessary design, fabrication, construction, testing and performance requirements for structures, systems and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. There may be some designs, as the introduction to the GDCs states, for which some of the GDCs may not be necessary or appropriate and these departures must be identified and justified. Passive plant designs, such as the ESBWR, are less dependent on the availability of offsite power in meeting the principal design criteria than non-passive plants and departures from the GDCs may be appropriate.

Other passive plant designs (i.e., the AP1000 design) have been evaluated for conformance with GDC 17. Section 8.2.3.2 of the NRC Final Safety Evaluation Report for the AP1000 (NUREG-1793), states:

> "The underlying purpose of the requirement of GDC 17 to have two offsite power sources to the plant is to ensure sufficient power to accomplish safety functions. The AP1000 design does not rely on power from the offsite system to accomplish safety functions, and therefore, the underlying purpose of the rule is met without the need for two independent offsite circuits."

The ESBWR design, like the AP1000 design, does not require offsite power to accomplish safety functions. Therefore, the underlying purpose of the GDC 17 requirements is met without the need for two independent offsite circuits.

In describing the Offsite Power System, Revision 5 of the ESBWR DCD, Section 8.1.2.2 states:

> "The system includes the switchyard and the high voltage tie lines to the high-side Motor Operated Disconnects (MODs) of the main generator circuit breaker, the high-side MODs of the Unit Auxiliary Transformers (UATs), and the high-side MODs of the Reserve Auxiliary Transformers (RATs).
>
> The offsite power system begins at the terminals on the transmission system side of the circuit breakers that connect the switchyard to the offsite transmission systems. It ends at the

connection to the input terminals of the MODs of the UATs, RATs, and main generator circuit breaker."

Therefore, the onsite power system begins at the connection to the input terminals of the MODs of the UATs, RATs and main generator circuit breaker, and feeds the plant loads. The transmission system, transmission network or utility grid ends at the terminals on the transmission system side of the circuit breakers that connect the switchyard to the offsite transmission systems.

As was mentioned above, GDC 17 applies to the design of electric power systems. GDC 17 requires that a number of specific criteria be addressed. The specific criteria are given below followed by a discussion as to how the Fermi 3 design meets those criteria.

> "An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents."
>
> > The ESBWR design meets this criterion as described in DCD Section 8.1.5.2.4, which states:
> >
> > > "Safety-related DC power sources are provided to support passive core cooling and passive containment integrity safety-related functions. No offsite or diesel-generator-derived AC power is required for 72 hours after an abnormal event."
> >
> > Therefore, the safety functions of systems supported by the electrical power system are designed such that they can be performed with either the offsite electrical power (assuming the onsite electrical power system is not functioning) or the onsite electrical power system (assuming the offsite electrical power system is not functioning).
>
> "The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure."
>
> > The ESBWR design meets this criterion as described in DCD Section 8.3.1.1.5, which provides a description of the conformance with the separation, redundancy and testability criteria for the onsite AC power system, and DCD Section 8.3.2.2.2, which describes the conformance with the design criteria related to independence, redundancy and testability for the onsite DC power system.

"Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights of way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained."

The Fermi 3 offsite power system design uses two overhead lines to connect the Unit Auxiliary and Reserve Auxiliary Transformers to the Fermi 3 switchyard. The two lines from the Fermi 3 Unit Auxiliary and Reserve Auxiliary Transformers (i.e., the Normal Preferred and Alternate Preferred Power Supplies) to the Fermi 3 switchyard are designed such that requirements for physical and electrical independence are met. The Fermi 3 switchyard is common to the Normal Preferred and Alternate Preferred Power Supplies. The Fermi 3 switchyard uses a breaker-and-a-half bus arrangement and connects to the transmission network using three 345 kV transmission lines.

The Fermi 3 design meets this criterion as the onsite power system is supplied by two physically and electrically independent circuits that connect to the transmission network at a common switchyard. The offsite power system is designed to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. Physical separation of the three transmission lines that connect the Fermi 3 switchyard to the Milan substation is not required in order for the Fermi 3 electrical power system to meet this criterion.

The criteria relating to the availability of offsite power circuits following a loss of other onsite and offsite AC power supplies or a loss of coolant accident are not applicable to the Fermi 3 design. As is described above, the offsite AC power system is not required to assure that specified acceptable fuel design limits or design conditions of the reactor coolant pressure boundary are not exceeded, or to assure that core cooling, containment integrity, and other vital safety functions are maintained.

"Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies."

A transmission system impact study was performed by ITC*Transmission* to support the connection of Fermi 3 to the transmission system. A description and the conclusions of the study are described in FSAR Section 8.2.2.1. As part of this study, alternative transmission system designs that enhance transmission system independence and reliability were considered (e.g., connecting the Fermi 2 and Fermi 3 switchyards to provide additional sources of power to the Fermi 3 switchyard). However, the alternative designs were found to introduce transmission system stability issues and were not recommended for implementation.

The ESBWR design complies with 10 CFR 50.63 (the Station Blackout Rule) as described in DCD Section 15.5.5 and can cope with a loss of all onsite and offsite AC power for up to 72 hours following an event. In addition, the ESBWR design is provided with Ancillary Diesel Generators and Standby Diesel Generators to power required loads after 72 hours in the event the offsite power cannot be restored.

Therefore, the design criteria, as well as the underlying purpose, of GDC 17 is met by the Fermi 3 design. The design of the Fermi 3 offsite power system provides reasonable assurance that the facility can be operated without undue risk to the health and safety of the public for the following reasons:

- The Fermi 3 offsite power system is not safety related and is not required to mitigate the consequences of a postulated event.

- The Fermi 3 offsite power system design meets the design criteria given in GDC 17.

- The Fermi 3 design complies with 10 CFR 50.63 and has additional design capabilities to cope with an extended loss of offsite power.

Proposed COLA Revision

None

Attachment 2
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-2

NRC RAI 08.02-2

DCD Section 8.2.3 states: "The normal preferred and alternate preferred circuits are fed from separate transmission systems, each capable of supplying the shutdown loads". FSAR Section 8.2.2.3.3 implies compliance with the DCD but makes no mention how the DCD requirement for "separate transmission systems" is met, especially since both the normal preferred and alternate preferred circuits at EF3 have the same termination points (the Switchyard at one end and the Milan Substation at the other), and are in the same transmission corridor for 29.4 miles. Explain how this can be construed as being fed from "separate transmission systems" since there is no diversity of transmission systems between the normal preferred and alternate preferred circuits from termination point to termination point.

Response

Chapter 8 of the ESBWR DCD describes the offsite and onsite electric power systems. DCD Section 8.1.5 describes the design basis for the electric power system. With regard to the design basis for the offsite power system, DCD Section 8.1.5.1 states:

> "Electric Power from the utility grid to the offsite power system is provided by transmission lines designed and located to minimize the likelihood of failure while ensuring grid reliability. The transmission system serves the main offsite power circuit (Normal Preferred Power), and the reserve offsite power circuit (Alternate Preferred Power) through the site switchyard(s)."

The paragraph above describes a single transmission system that serves the Normal Preferred Power Supply (NPPS) and Alternate Preferred Power Supply (APPS) circuits. DCD Section 8.2.3 conflicts with DCD Section 8.1.5.1, as it states that the NPPS and APPS circuits are supplied by more than one transmission system. Fermi 3 conforms to the design basis as stated in DCD Section 8.1.5.1, in that it uses multiple transmission lines from a single transmission system to serve the NPPS and APPS through the Fermi 3 switchyard.

GEH has made a correction the DCD to make the language in DCD Section 8.2.3 consistent with that in DCD Section 8.1.5.1. This correction will be submitted as part of Revision 6 to the ESBWR DCD. With the anticipated DCD changes, no change to the Fermi 3 COLA is necessary.

Proposed COLA Revision

None

Attachment 3
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-3

NRC RAI 08.02-3

Section 8.2.2.1 discusses reliability of the transmission lines. RG 1.206 states that FSAR should discuss grid availability, including the frequency, duration, and causes of outages over the past 20 years for both the transmission system accepting the unit's output and the transmission system providing the preferred power for the unit's loads. Provide 345 kV transmission line and substation historical outage and failure data for the ITC Transmission network over the past 20 years.

Response

Detroit Edison reviewed equipment failure history for the time period from 1988 to 2008. The Milan Substation is the proposed substation to which Fermi 3 will be connected. The Milan Substation receives 345kV power from the Majestic Substation via the Lemoyne-Majestic and the Majestic-Milan circuits. The Milan Substation provides 345kV power to Monroe Power Plant and the Allen Junction Substation (owned by First Energy) via the Allen Junction-Milan-Monroe circuit. This review was limited to the major equipment, at the 345kV voltage level, affecting the Milan Substation, as it is the most representative of the transmission system reliability affecting Fermi 3. The major types of equipment that can affect reliability of the Fermi 3 switchyard are transmission lines and circuit breakers.

Transmission Lines – The Lemoyne - Majestic 345kV line has experienced two momentary outages; one due to unknown causes and the other due to an X to Z phase fault approximately 80 miles from Majestic inside the First Energy portion of the circuit. The Lemoyne - Majestic 345kV line has experienced two sustained outages totaling 3,543 minutes. One of these sustained outages had a duration of 3,438 minutes which was caused by a breaker failure. The other sustained outage had a duration of 105 minutes and relay reports indicate that the cause could have been a stray RF signal during a bus restoration procedure.

Circuit Breakers – The Majestic breaker in position AF has experienced one sustained outage for duration of 261 minutes. The cause of this sustained outage was due to failed AC station equipment (breaker tripped due to SF6 differential operation). The proposed Fermi 3 switchyard breaker and a half bus configuration is highly reliable and allows for a circuit breaker lockout without adversely impacting the ability of the switchyard to perform its function.

The local transmission system has only experienced one complete loss of power in the last 20 years, a regional electric grid disturbance on August 14, 2003. This event is described in Fermi 2 Licensee Event Report (LER) 2003-002 dated October 10, 2003. In describing the event, LER 2003-002 indicates that offsite power was fully restored approximately 21 ½ hours after the loss of power. However, offsite power was available approximately 6 ½ hours after the loss of power but was not restored as the plant loads were being supplied by the Emergency Diesel Generators and the Combustion Turbine Generator.

In summary, the transmission lines and circuit breakers presently in service that will provide offsite power to the Fermi 3 switchyard and receive power from the Fermi 3 switchyard have experienced relatively few outages.

Proposed COLA Revision

None

Attachment 4
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-4

NRC RAI 08.02-4

Section 8.2.1.1 discusses the common transmission corridor for the three outgoing Fermi transmission lines. In view of the common corridor for the transmission lines, discuss why the phenomenon of galloping conductors will not be accentuated in the corridor resulting in flashovers and structural damage to multiple transmission line conductors and hardware.

Response

Detroit Edison conducted a search of industry operating experience with regard to factors influencing the incidence of galloping conductors. According to the EPRI paper entitled "Updating the EPRI Transmission Line Reference Book: Wind-Induced Conductor Motion ("The Orange Book") 2005 Progress Report, 1010223, Technical Update, October 2005," (*http://mydocs.epri.com/docs/public/000000000001010223.pdf*) the frequency with which galloping occurs is closely related to environmental conditions such as the frequency of icing, smooth-countered terrain with few large obstacles, and localized areas near lakes or rivers. No relationship to the number of transmission lines in a transmission corridor was identified in the search of industry operating experience.

The proposed design for connection of Fermi 3 to the transmission system uses three transmission lines from the Fermi 3 switchyard to the Milan Substation in a common corridor. The use of the proposed common transmission corridor for the three proposed circuits between Fermi 3 and the Milan Substation would not be expected to accentuate the occurrence of galloping as the phenomenon is a function of environmental conditions and not the number of circuits.

Proposed COLA Revision

None

Attachment 5
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-5

NRC RAI 08.02-5

Identify how the lightning protection mentioned in Section 8.2.2.1 and DCD Section 8.2.3 will be implemented for the transmission system and switchyard. Also indicate how the lightning protection system will be periodically maintained and tested to assure functionality and effectiveness throughout the life of EF3.

Response

Fermi 3 switchyard lightning protection system will be designed in accordance with IEEE Standard 998-1996 (R2002), "IEEE Guide for Direct Lightning Stroke Shielding of Substations," using the Rolling Sphere Method as provided by the transmission operator.

Periodic monitoring, maintenance and testing of the switchyard lightning protection system include the following activities:

- Lightning surge arresters are thermally scanned using infrared technology annually
- Lightning surge arresters are power factor tested during bus inspections and/or relay control scheme testing on a 10 year cycle

Proposed COLA Revision

FSAR Section 8.2.1.2.1 will be revised to add a description of the transmission system and switchyard lightning protection as shown in the attached markup.

Markup of Detroit Edison COLA

(Following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Delete the last paragraph and add the following paragraph.

Normal and alternate preferred power to the UATs and RATs, respectively, is via overhead conductors. To maintain their independence from each other, the conductors are routed such that they are physically and electrically separate from each other.

8.2.1.2.1 **Switchyard**

Replace the last paragraph with the following.

EF3 COL 8.2.4-2-A
EF3 COL 8.2.4-6-A
EF3 COL 8.2.4-7-A
EF3 COL 8.2.4-8-A

The Fermi 3 switchyard, prior to the point of interconnection with Fermi 3, is a 345 kV, air-insulated, breaker-and-a-half bus arrangement. Fermi 3 is connected to this switchyard by overhead conductors, the normal preferred and alternate preferred power conductors.

The anticipated physical location and electrical interconnection of the 345 kV switchyard for Fermi 3 is shown on Figure 8.2-201 and Figure 8.2-202.

The 345 kV switchyard for Fermi 3 receives two sources of AC auxiliary power from the 6.9 kV Plant Investment Protection (PIP) buses for the normal preferred switchyard power center and alternate preferred switchyard power center, as shown on DCD Figure 8.1-1. The switchyard auxiliary power system is designed with adequate equipment, standby power, and protection to provide maximum continuity of service for operation of the essential switchyard equipment during both normal and abnormal conditions. There are two independent sets of 125 V DC batteries, chargers, and DC panels for the switchyard relay and control systems DC supply requirements. Each charger is powered from a separate AC source with an automatic switchover to the alternate source, in the event the preferred source is lost. The distribution systems for the two battery systems are physically separated.

Control and relay protection systems are provided. Support systems, such as grounding, raceway, lighting, AC/DC station service, and switchyard lightning protection, are also provided.

Add Insert "1" Here

Insert 1

Periodic monitoring of cable insulation for underground medium voltage cable will be conducted to detect potential cable degradation from moisture intrusion. This program is based upon the recommendations of the EPRI Cable Task Force and establishes preventive maintenance activities for periodic inspection and testing of cables and cable vaults associated with systems within the scope of 10 CFR 50.65.

Fermi 3 switchyard lightning protection system is designed in accordance with IEEE Standard 998-1996 (R2002), "IEEE Guide for Direct Lightning Stroke Shielding of Substations," using the Rolling Sphere Method. Periodic monitoring, maintenance and testing of the switchyard lightning protection system includes the following activities:

- Lightning surge arresters are thermally scanned using infrared technology annually
- Lightning surge arresters are power factor tested during bus inspections and/or relay control scheme testing on a 10 year cycle

The 345 kV switchyard for Fermi 3 does not require any transformers for Fermi 3. Therefore, Fermi 3 switchyard transformer protection is not required.

Attachment 6
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-6

NRC RAI 08.02-6

Section 8.2.1.2.3 states that routine tests will be conducted on the batteries and battery chargers. Describe the periodic surveillance and maintenance tests that will be performed on the batteries and battery chargers located in the 345 kV Switchyard, and the criteria established for battery replacement. Also, describe the periodic surveillance and maintenance tests with frequency that will be performed on the circuit breakers, potential transformers, lightning arrestors, capacitive coupling voltage transformers, current transformers, microwave channels, communication equipment, annunciator panels, security equipment, switchyard grounding system, surge arrestors, and other equipment in the 345 kV switchyard.

Response

Routine switchyard testing and inspection activities performed by the transmission operator include, but are not necessarily limited to, the following:

- Station Batteries and Chargers – Tested annually. Battery load tested every 5 years
- Circuit Breaker Inspections – Every 6 years or after 10 automatic operations
- Current Transformers (CTs), Potential Transformers (PTs), and Coupling Capacitive Voltage Transformer (CCVTs) – Tested concurrently with control schemes on a 10 year cycle
- Communication Equipment (including Line Tuners and Wave Traps) – Tested concurrently with control schemes on a 10 year cycle.
- Ground Mat Integrity – Tested every 15 years
- Station infrared (IR) scans – Annually
- Switchyard Inspection – Monthly manual walk through of substation mat to visually inspect all equipment, including but not limited to; locks, fencing, control houses
- Relays
    - Electromechanical Type – Calibrated on a 5 year cycle
    - Microprocessor Type – Calibrated on a 10 year cycle
    - Control schemes – Tested for operation and insulation integrity on a 10 year cycle

- Bus Inspection/Disconnect Switches – Tested concurrently with control schemes on a 10 year cycle

- Backup AC Generators – Biannual inspections, includes annual load testing

The transmission operator has no established criteria for switchyard battery replacement. The need for battery replacement is evaluated by the transmission operator considering factors such as the age of the equipment, the condition of the equipment based upon inspection results, and equipment testing results.

Proposed COLA Revision

FSAR Section 8.2.1.2.3 will be revised to add a description of the routine testing and maintenance for switchyard equipment as shown in the attached markup.

Markup of Detroit Edison COLA

(Following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

inspection focuses on such items as right-of-way encroachment, vegetation management, conductor and line hardware condition, and the condition of supporting structures.

~~Routine switchyard inspection activities include, but are not necessarily limited to, the following:~~

- ~~Periodic inspection of circuit breakers~~
- ~~Semi-annual infrared scan of substation equipment~~
- ~~Semi-annual inspection of substation equipment~~
- ~~Periodic relay inspections~~

~~Routine switchyard testing activities include, but are not necessarily limited to, the following:~~

- ~~5-year relay calibration~~
- ~~10-year ground grid testing~~
- ~~Semi-annual battery/charger inspection w/annual preventative maintenance~~ Replace text with Insert "2"

8.2.2.1 Reliability and Stability Analysis

Replace this section with the following.

EF3 COL 8.2.4-9-A
EF3 COL 8.2.4-10A

A system impact study performed by ITC*Transmission* analyzed loadflow, transient stability and fault analysis for the addition of Fermi 3. (Reference 8.2-201) The base case for this analysis represented the expected system configuration and loading in 2017 and included planned transmission projects that had budgetary approval at the time the analysis was performed. The sub-transmission system used for the analysis represented the summer for 2007 case and did not include any planned upgrades beyond that time. Stability analysis was performed on both the 2017 summer peak base model and the 2017 eighty percent model with Fermi 3 and projected network upgrades included.

The ITC*Transmission* system was analyzed for thermal and voltage limitations for normal and post contingency conditions via power flow analysis using Power Technology International Software PSS/E and MUST power flow and contingency analysis simulation tools. The analysis examined potential constraints such as thermal equipment overloads, voltage criteria violations, breakers that exceed their rated

Insert 2

Routine switchyard testing and inspection activities include, but are not necessarily limited to, the following:

- Circuit Breaker Inspections – Every 6 years or after 10 automatic operations
- Station infrared (IR) scans – Annually
- Switchyard Inspection – Monthly manual walk through of substation mat to visually inspect all equipment, including but not limited to; locks, fencing, control houses
- Station Batteries and Chargers – Tested annually. Battery load tested every 5 years
- Relays
  - Electromechanical Type – Calibrated on a 5 year cycle
  - Microprocessor Type – Calibrated on a 10 year cycle
  - Control schemes – Tested for operation and insulation integrity on a 10 year cycle
- Current Transformers (CTs), Potential Transformers (PTs), and Coupling Capacitive Voltage Transformer (CCVTs) – Tested concurrently with control schemes on a 10 year cycle
- Communication Equipment (including Line Tuners and Wave Traps) – Tested concurrently with control schemes on a 10 year cycle.
- Bus Inspection/Disconnect Switches – Tested concurrently with control schemes on a 10 year cycle
- Backup AC Generators – Biannual inspections, includes annual load testing
- Ground Mat Integrity – Tested every 15 years

Monitoring, maintenance and testing of the switchyard protection will be performed under North American Electric Reliability Corporation (NERC) Standard PRC-005-1, "Transmission and Generation Protection System Maintenance and Testing."

Attachment 7
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-7

NRC RAI 08.02-7

Section 8.2.2.1 discusses the reliability of the switchyard. Information relating to the potential for cable submergence in the switchyard has not been addressed. Describe how low voltage power, control, and instrumentation cables that are expected to be partially or continuously submerged in manholes, trenches, and duct banks are qualified. Also, provide the design features and/or in-situ monitoring programs that will be implemented to avoid or arrest the degradation of cable insulation from the effects of moisture. Include cables traversing the switchyard, as well as those from the switchyard to the EF3 unit.

Response

As is described in FSAR Section 8.2.1.2, the normal and alternate preferred power is provided to the Unit Auxiliary Transformers and Reserve Auxiliary Transformers using 345kV overhead conductors. Therefore, cable submergence is not a concern for high voltage cables at Fermi 3 and no periodic inspection or testing is required.

Periodic monitoring of cable insulation for underground medium voltage cable will be conducted to detect potential cable degradation from moisture intrusion. Medium voltage cables will be monitored in a manner similar to that described in the Fermi 2 Electrical Cable Monitoring Program. This program is based upon the recommendations of the EPRI Cable Task Force and establishes preventive maintenance activities for periodic inspection and testing of cables and cable vaults associated with systems within the scope of 10 CFR 50.65. Experience from this program will be used to establish testing and inspection frequencies, and to specify testing methods employed for medium voltage underground cables at Fermi 3.

The Fermi 2 Electrical Cable Monitoring Program was described in the Fermi 2 response to NRC GL 2007-01(Fermi 2 Letter, NRC-07-0017, dated May 4, 2007). On October 31,2008, the NRC issued "Fermi 2 – Closeout of Generic Letter 2007-01 "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients" (TAC No. MD4328)," in which the NRC staff concluded the Fermi 2 response adequately addressed the concerns in GL 2007-01.

Detroit Edison does not believe that a testing program is necessary for low voltage power, control or instrumentation cable in underground circuits. It should be noted that this request is similar to Reference COLA RAI 08.02-40 provided to Dominion by the NRC in a letter dated March 9, 2009. In a letter dated April 6, 2009, the NRC concluded that the information requested in RAI 08.02-40 was not necessary for the staff's review.

Proposed COLA Revision

FSAR Section 8.2.1.2.1 will be revised to include a discussion on underground cable testing as indicated in the attached markup.

Markup of Detroit Edison COLA

(Following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Delete the last paragraph and add the following paragraph.

Normal and alternate preferred power to the UATs and RATs, respectively, is via overhead conductors. To maintain their independence from each other, the conductors are routed such that they are physically and electrically separate from each other.

8.2.1.2.1 **Switchyard**

Replace the last paragraph with the following.

EF3 COL 8.2.4-2-A
EF3 COL 8.2.4-6-A
EF3 COL 8.2.4-7-A
EF3 COL 8.2.4-8-A

The Fermi 3 switchyard, prior to the point of interconnection with Fermi 3, is a 345 kV, air-insulated, breaker-and-a-half bus arrangement. Fermi 3 is connected to this switchyard by overhead conductors, the normal preferred and alternate preferred power conductors.

The anticipated physical location and electrical interconnection of the 345 kV switchyard for Fermi 3 is shown on Figure 8.2-201 and Figure 8.2-202.

The 345 kV switchyard for Fermi 3 receives two sources of AC auxiliary power from the 6.9 kV Plant Investment Protection (PIP) buses for the normal preferred switchyard power center and alternate preferred switchyard power center, as shown on DCD Figure 8.1-1. The switchyard auxiliary power system is designed with adequate equipment, standby power, and protection to provide maximum continuity of service for operation of the essential switchyard equipment during both normal and abnormal conditions. There are two independent sets of 125 V DC batteries, chargers, and DC panels for the switchyard relay and control systems DC supply requirements. Each charger is powered from a separate AC source with an automatic switchover to the alternate source, in the event the preferred source is lost. The distribution systems for the two battery systems are physically separated.

Control and relay protection systems are provided. Support systems, such as grounding, raceway, lighting, AC/DC station service, and switchyard lightning protection, are also provided.

Add Insert "1" Here

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Periodic monitoring of cable insulation for underground medium voltage cable will be conducted to detect potential cable degradation from moisture intrusion. This program is based upon the recommendations of the EPRI Cable Task Force and establishes preventive maintenance activities for periodic inspection and testing of cables and cable vaults associated with systems within the scope of 10 CFR 50.65.

Fermi 3 switchyard lightning protection system is designed in accordance with IEEE Standard 998-1996 (R2002), "IEEE Guide for Direct Lightning Stroke Shielding of Substations," using the Rolling Sphere Method. Periodic monitoring, maintenance and testing of the switchyard lightning protection system includes the following activities:

- Lightning surge arresters are thermally scanned using infrared technology annually
- Lightning surge arresters are power factor tested during bus inspections and/or relay control scheme testing on a 10 year cycle

The 345 kV switchyard for Fermi 3 does not require any transformers for Fermi 3. Therefore, Fermi 3 switchyard transformer protection is not required.

Attachment 8
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-8

NRC RAI 08.02-8

FSAR Section 8.2.2.1, Reliability and Stability Analysis, EF3 COL 8.2.4-10A, did not identify maximum and minimum switchyard voltage limits of 345 kV transmission system. Provide maximum and minimum switchyard voltage limits. Explain how these limits were established, and confirm that these voltage limits are acceptable for auxiliary power system equipment operation including safety-related battery chargers and safety-related uninterruptible power supplies during different operating conditions. The confirmation should include assumptions, acceptance criteria and summaries of results related to the following: load flow analysis (bus and load terminal voltages of the station auxiliary system), short circuit analysis, equipment sizing studies, protective relay setting and coordination, and motor starting with minimum and maximum grid voltage conditions. A separate set of calculations should be performed for each available connection to offsite power supply. In addition, please discuss how the results of the calculations will be verified.

Response

As is described in FSAR Section 8.2.2.1, the maximum and minimum switchyard voltage limits established by ITC*Transmission* will be applied to the 345 kV switchyard. Per the ITC*Transmission* planning standard, ITC*Transmission* typically plans for a voltage range of 97% - 105% of nominal voltage. Specific transformer impedance and tap settings will be determined during detailed design to ensure that power plant distribution voltages will be within the required ranges. Considering that electrical equipment is typically rated for operation at +/- 10% terminal voltage, and considering the ability to adjust taps on unit substation transformers within the ESBWR, it is reasonable to expect that the plant power distribution system can be optimized to supply power within the required voltage range to plant equipment.

The DCD does not contain limits for voltage and frequency variation that need to be met by site-specific offsite power systems. Analyses of the as-built onsite power system will be performed to determine the load requirements during design basis operating modes. These analyses will, in part, specify required power, voltage, frequency, and interrupting capability necessary for the offsite power system to support safety-related load operation during design basis operating modes. These analyses will be accomplished as part of a site specific Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) and will ensure that each as-built offsite circuit has sufficient capacity and capability. As described in the response to Fermi 3 RAI 14.3.6-1 (Reference 3), Detroit Edison has developed site specific ITAAC, consistent with the response to DCD RAI 14.3-394 S01, for the offsite power system.

Proposed COLA Revision

None

Attachment 9
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-9

NRC RAI 08.02-9

FSAR Section 8.2.1.2.3 discusses switchyard components testing and inspection. Discuss the industry (FERC, NERC, and IEEE) standards that will be followed for switchyard protection system, monitoring, maintenance and testing.

Response

Monitoring, maintenance and testing of the switchyard protection system are performed by the transmission operator under NERC Standard PRC-005-1, "Transmission and Generation Protection System Maintenance and Testing."

Proposed COLA Revision

FSAR Section 8.2.1.2.3 will be revised to include a discussion of the industry standards used for monitoring, maintenance, and testing of the switchyard protection system as shown in the attached markup.

Markup of Detroit Edison COLA

(Following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

inspection focuses on such items as right-of-way encroachment, vegetation management, conductor and line hardware condition, and the condition of supporting structures.

~~Routine switchyard inspection activities include, but are not necessarily limited to, the following:~~

- ~~Periodic inspection of circuit breakers~~
- ~~Semi-annual infrared scan of substation equipment~~
- ~~Semi-annual inspection of substation equipment~~
- ~~Periodic relay inspections~~

~~Routine switchyard testing activities include, but are not necessarily limited to, the following:~~

- ~~5-year relay calibration~~
- ~~10-year ground grid testing~~
- ~~Semi-annual battery/charger inspection w/annual preventative maintenance~~ Replace text with Insert "2"

8.2.2.1 **Reliability and Stability Analysis**

Replace this section with the following.

EF3 COL 8.2.4-9-A
EF3 COL 8.2.4-10A

A system impact study performed by ITC*Transmission* analyzed loadflow, transient stability and fault analysis for the addition of Fermi 3. (Reference 8.2-201) The base case for this analysis represented the expected system configuration and loading in 2017 and included planned transmission projects that had budgetary approval at the time the analysis was performed. The sub-transmission system used for the analysis represented the summer for 2007 case and did not include any planned upgrades beyond that time. Stability analysis was performed on both the 2017 summer peak base model and the 2017 eighty percent model with Fermi 3 and projected network upgrades included.

The ITC*Transmission* system was analyzed for thermal and voltage limitations for normal and post contingency conditions via power flow analysis using Power Technology International Software PSS/E and MUST power flow and contingency analysis simulation tools. The analysis examined potential constraints such as thermal equipment overloads, voltage criteria violations, breakers that exceed their rated

Insert 2

Routine switchyard testing and inspection activities include, but are not necessarily limited to, the following:

- Circuit Breaker Inspections – Every 6 years or after 10 automatic operations
- Station infrared (IR) scans – Annually
- Switchyard Inspection – Monthly manual walk through of substation mat to visually inspect all equipment, including but not limited to; locks, fencing, control houses
- Station Batteries and Chargers – Tested annually. Battery load tested every 5 years
- Relays
  - Electromechanical Type – Calibrated on a 5 year cycle
  - Microprocessor Type – Calibrated on a 10 year cycle
  - Control schemes – Tested for operation and insulation integrity on a 10 year cycle
- Current Transformers (CTs), Potential Transformers (PTs), and Coupling Capacitive Voltage Transformer (CCVTs) – Tested concurrently with control schemes on a 10 year cycle
- Communication Equipment (including Line Tuners and Wave Traps) – Tested concurrently with control schemes on a 10 year cycle.
- Bus Inspection/Disconnect Switches – Tested concurrently with control schemes on a 10 year cycle
- Backup AC Generators – Biannual inspections, includes annual load testing
- Ground Mat Integrity – Tested every 15 years

Monitoring, maintenance and testing of the switchyard protection will be performed under North American Electric Reliability Corporation (NERC) Standard PRC-005-1, "Transmission and Generation Protection System Maintenance and Testing."

Attachment 10
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-10

NRC RAI 08.02-10

FSAR Section 8.2.2.1 states "Upon approaching or exceeding a limit, these procedures verify availability of required and contingency equipment and materials, direct notifications to outside agencies and address unit technical specifications (TS) actions until the normal voltage schedule can be maintained." Since the FSAR does not identify TS for the offsite power system, please clarify the reference to TS in this Section 8.2.2.1 statement.

Response

Fermi 3 will implement operating procedures to maintain the switchyard voltage schedule and address challenges to the maximum and minimum limits. The Fermi 3 procedures will not reference any TS for offsite power, because it is not required. Therefore, Detroit Edison will revise the FSAR Section 8.2.2.1 discussion of the operating procedures to delete the reference to the TS.

Proposed COLA Revision

FSAR Section 8.2.2.1 will be revised to remove the reference to unit technical specification actions as indicated in the attached markup.

Markup of Detroit Edison COLA

(Following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

capabilities as well as constraints related to maintaining system stability and the sudden loss of single critical generation.

EF3 COL 8.2.4-10A

The equipment considered is from the point of interconnection of Fermi 3 to the switchyard out to the 345 kV transmission system. Maximum and minimum switchyard voltage limits established by ITC*Transmission* will be applied to the 345 kV switchyard. Normal operating and abnormal procedures exist to maintain the switchyard voltage schedule and address challenges to the maximum and minimum limits. ~~Upon~~ approaching or exceeding a limit, these procedures verify ~~the~~ availability of required and contingency equipment and materials, and direct notifications to outside agencies~~, and address unit Technical Specifications actions~~ until the normal voltage schedule can be maintained. Detroit Edison will establish a Generator Interconnection and Operation Agreement with ITC*Transmission* and protocols for maintenance, communications, switchyard control, and system analysis sufficient to safely operate and maintain the power station interconnection to the transmission system.

ITC*Transmission* in conjunction with the Midwest ISO provides analysis capabilities for both Long Term Planning and Real Time Operations. System conditions are evaluated to ensure a bounding analysis and model parameters are selected that are influential in determining the system's ability to provide offsite power adequacy. Elements included in the analysis are system load forecasts (including sufficient margin to ensure a bounding analysis over the life of the study), system generator dispatch (including outages of generators known to be particularly influential in offsite power adequacy of affected nuclear units), outage schedules for transmission elements that have significant influence on offsite power adequacy, cross-system power transfers and power imports/exports, and system modification plans and schedules. A Real Time State Estimator is used to assist in the evaluation of actual system conditions.

The study concluded that with the additional generating capacity of Fermi 3, the transmission system remains stable under the analyzed conditions, preserving the grid connection and supporting the normal and shutdown power requirements of Fermi 3.

The reliability of the overall system design is indicated by the fact that there have been no widespread system interruptions. Failure rates of individual facilities are low. Most lightning-caused outages are momentary, with few instances of line damage. Other facilities do fail

Attachment 11
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-11

NRC RAI 08.02-11

FSAR Chapter 1, Table 1.9-201, "Conformance with Standard Review Plan" for SRP Section 8.2 indicates that EF3 complies with the requirements of 10 CFR 50.65(a)(4) (SRP8.2: Acceptance Criteria II.8). However, review of Chapter 8 identified no discussion regarding 10 CFR 50.65. Please clarify compliance with the requirements of 10 CFR 50.65(a)(4). In particular, the subject regulation is one aspect of the "Maintenance Rule" (10 CFR 50.65), an operational program, the implementation of which is addressed by Item 17 in FSAR Table 13.4-201 and the content of which is discussed in FSAR Section 17.6. The staff requests that the applicant address applicability of the Maintenance Rule to switchyard components, discuss actions to be taken to limit the risk associated with transmission system degradation and discuss actions required before performing grid-risk sensitive maintenance activities of switchyard components (see NRC Generic Letter 2006-02: Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power referenced in SRP section 8.2).

Response

The Fermi 3 offsite power system compliance with the requirements of 10 CFR 50.65(a)(4) is indicated in FSAR Table 1.9-201 by the stated conformance to SRP Section 8.2, Acceptance Criterion II.8. The implementation of the requirements of 10 CFR 50.65 is addressed as an operational program by Item 17 in FSAR Table 13.4-201 with an implementation schedule of prior to fuel load authorization.

Maintenance Rule Program (10 CFR 50.65) implementation is discussed in FSAR Section 17.6, which incorporates by reference Nuclear Energy Institute (NEI) Technical Report 07-02, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52." The NRC has reviewed NEI 07-02 and issued their final Safety Evaluation (SE) on January 24, 2008. NEI reissued the report, after incorporating the NRC SE and RAIs, as NEI 07-02A. The reference to this topical report in FSAR Table 1.6-201 was updated in Revision 1 of the Fermi 3 COLA (Reference 4) to reference NEI 07-02A.

The scope of structures, systems, and components (SSCs) covered by the Maintenance Rule Program is determined using the scoping procedure defined in the maintenance rule program description per NEI 07-02A. This scoping evaluation is performed as part of the program implementation and is not required to be completed prior to COL issuance. The offsite power system and its components will be evaluated for inclusion into the maintenance rule program in accordance with these scoping procedures during program implementation. As discussed in the program description, the expert panel is used to scope SSCs into and out of the maintenance rule program. This aspect of the program was evaluated by the NRC staff as documented in the staff's safety evaluation report for NEI 07-02A.

NEI 07-02A, Section 17.X.1.5, addresses risk assessment and risk management per 10 CFR 50.65(a)(4) and includes consideration of the issues associated with grid/offsite power system reliability as identified in NRC Generic Letter 2006-02, Items 5 and 6. NEI 07-02A, Section 17. X.5 identifies a Maintenance Rule Program implementation schedule consistent with FSAR Table 13.4-201, Item 17 (i.e., by the time that initial fuel loading has been authorized).

Therefore, although detailed Maintenance Rule Program development is not anticipated in advance of the schedule defined in Table 13.4-201, performance of grid reliability evaluations as part of the maintenance risk assessment before performing "grid-risk-sensitive" maintenance activities (such as surveillances, post-maintenance testing, and preventive and corrective maintenance) is considered to be a necessary consideration of the program in accordance with NEI 07-02A guidance.

The updated reference to NEI 07-02A was included in Revision 1 of RCOLA Table 1.6-201. This change was also included in Revision 1 of the Fermi 3 COLA. The affected Revision 1 page is included with this response.

Proposed COLA Revision

None.

Excerpts from Revision 1 of the Detroit Edison COLA
(Following 1 page)

Table 1.6-201 Referenced Topical Reports [EF3 SUP 1.6-1]

Report No.	Title	Section No.
NEI 06-13A	Nuclear Energy Institute, "Technical Report on Template for an Industry Training Program Description," NEI 06-13A, Revision 1, March 2008	Appendix 13 BB
NEI 06-14A	Nuclear Energy Institute, "Quality Assurance Program Description," NEI 06-14A, Revision 4, July 2007	17.5
NEI 07-02A	Nuclear Energy Institute, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," NEI 07-02A, March 2008	17.6
NEI 07-03	Nuclear Energy Institute, "Generic FSAR Template Guidance for Radiation Protection Program Description," NEI 07-03, Revision 3, October 2007	Appendix 12 BB
NEI 07-08	Nuclear Energy Institute, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)," NEI 07-08, Revision 0, September 2007	Appendix 12 AA
NEI 07-09	Nuclear Energy Institute, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," NEI 07-09, Revision 0, September 2007	11.5
NEI 07-10	Nuclear Energy Institute, "Generic FSAR Template Guidance for Process Control Program (PCP)," NEI 07-10, Revision 2, February 2008	11.4

Attachment 12
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-12

NRC RAI 08.02-12

The resolution for the DCD item 8.2.4-5-A, "Protective Relaying," is incorporated in the COL FSAR Section 8.2.2.1, which does not discuss this subject. The correct location for this response is FSAR, Section 8.2.1.2.2. Please modify accordingly.

Response

Detroit Edison submitted Revision 1 of the COLA in Reference 4. Revisions to the COLA to address this RAI were included in Revision 1 of the COLA. The resolution for the DCD item 8.2.4-5-A, "Protective Relaying," correctly references FSAR Section 8.2.1.2.2 in Revision 1 of the COLA.

The affected Revision 1 pages are included with this response.

Proposed COLA Revision

None.

Excerpts from Revision 1 of the Detroit Edison COLA
(Following 2 pages)

The anticipated capacity and electrical characteristics for switchyard equipment are as follows:

Breakers	Max Design (kV)	Rated Current (A)	Interrupting Current at Max kV
345 kV	379.5	3250	63 kA

Transmission Lines	Rated Current at 86°F
345 kV	2940 A

Bus Work	Rated Current
345 kV	3660 A

EF3 COL 8.2.4-5-A

8.2.1.2.2 Protective Relaying

The 345 kV transmission lines are protected with redundant high-speed communications-assisted relay schemes and include automatic breaker reclosing. The 345 kV switchyard buses have redundant differential protection using separate and independent current and control circuits. Normal and alternate preferred power conductors located between the Fermi 3 UATs and RATs and the 345 kV switchyard buses are protected by dual high-speed current differential schemes.

The 345 kV switchyard circuit breakers are equipped with breaker failure protection. All of these breakers have dual trip coils. There are two independent DC supply systems, each with a 125 V battery and battery charger. Each redundant protection scheme that supplies a trip signal is powered from its redundant DC power supply and connected to a separate trip coil.

The 345 kV switchyard for Fermi 3 does not require any transformers for Fermi 3. Therefore, Fermi 3 switchyard transformer protection is not required.

EF3 SUP 8.2-2

8.2.1.2.3 Testing and Inspection

Transmission lines are periodically inspected via an aerial inspection program in accordance with the ITC*Transmission* inspection plan. The

8.2.4-5-A Protective Relaying

EF3 COL 8.2.4-5-A This COL item is addressed in Subsection 8.2.1.2.2.

8.2.4-6-A Switchyard DC Power

EF3 COL 8.2.4-6-A This COL item is addressed in Subsection 8.2.1.2.1.

8.2.4-7-A Switchyard AC Power

EF3 COL 8.2.4-7-A This COL item is addressed in Subsection 8.2.1.2.1.

8.2.4-8-A Switchyard Transformer Protection

EF3 COL 8.2.4-8-A This COL item is addressed in Subsection 8.2.1.2.1.

8.2.4-9-A Stability and Reliability of the Offsite Transmission Power Systems

EF3 COL 8.2.4-9-A This COL item is addressed in Subsection 8.2.2.1.

8.2.4-10-A Interface Requirements

EF3 COL 8.2.4-10-A This COL item is addressed in Subsection 8.2.2.1.

8.2.1 References

8.2-201 ITC*Transmission*, System Impact Study Report (MISO G867), "Generation Interconnection in Monroe County, MI", July 21, 2008.

Attachment 13
NRC3-09-0011

Response to RAI Letter No. 6
(eRAI Tracking No. 2168)

RAI Question No. 08.02-13

NRC RAI 08.02-13

The resolution for the DCD item 8.2.4-8-A, "Switchyard Transformer Protection," is incorporated in the COL FSAR Section 8.2.1.2.1, which does not discuss this subject. The correct location for this response is FSAR, Section 8.2.1.2.2. Please modify accordingly.

Response

As described in FSAR Section 8.2.1.2.2, the 345kV switchyard for Fermi 3 does not require any transformers for Fermi 3 and switchyard transformer protection is not required. A discussion of switchyard transformer protection, similar to that in FSAR Section 8.2.1.2.2, will be included in FSAR Section 8.2.1.2.1 and will correct the reference for DCD item 8.2.4-8-A.

Proposed COLA Revision

FSAR Section 8.2.1.2.1 will be revised to include a discussion on switchyard transformer protection as indicated in the attached markup.

Markup of Detroit Edison COLA

(Following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Delete the last paragraph and add the following paragraph.

Normal and alternate preferred power to the UATs and RATs, respectively, is via overhead conductors. To maintain their independence from each other, the conductors are routed such that they are physically and electrically separate from each other.

8.2.1.2.1 **Switchyard**

Replace the last paragraph with the following.

EF3 COL 8.2.4-2-A
EF3 COL 8.2.4-6-A
EF3 COL 8.2.4-7-A
EF3 COL 8.2.4-8-A

The Fermi 3 switchyard, prior to the point of interconnection with Fermi 3, is a 345 kV, air-insulated, breaker-and-a-half bus arrangement. Fermi 3 is connected to this switchyard by overhead conductors, the normal preferred and alternate preferred power conductors.

The anticipated physical location and electrical interconnection of the 345 kV switchyard for Fermi 3 is shown on Figure 8.2-201 and Figure 8.2-202.

The 345 kV switchyard for Fermi 3 receives two sources of AC auxiliary power from the 6.9 kV Plant Investment Protection (PIP) buses for the normal preferred switchyard power center and alternate preferred switchyard power center, as shown on DCD Figure 8.1-1. The switchyard auxiliary power system is designed with adequate equipment, standby power, and protection to provide maximum continuity of service for operation of the essential switchyard equipment during both normal and abnormal conditions. There are two independent sets of 125 V DC batteries, chargers, and DC panels for the switchyard relay and control systems DC supply requirements. Each charger is powered from a separate AC source with an automatic switchover to the alternate source, in the event the preferred source is lost. The distribution systems for the two battery systems are physically separated.

Control and relay protection systems are provided. Support systems, such as grounding, raceway, lighting, AC/DC station service, and switchyard lightning protection, are also provided.

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Periodic monitoring of cable insulation for underground medium voltage cable will be conducted to detect potential cable degradation from moisture intrusion. This program is based upon the recommendations of the EPRI Cable Task Force and establishes preventive maintenance activities for periodic inspection and testing of cables and cable vaults associated with systems within the scope of 10 CFR 50.65.

Fermi 3 switchyard lightning protection system is designed in accordance with IEEE Standard 998-1996 (R2002), "IEEE Guide for Direct Lightning Stroke Shielding of Substations," using the Rolling Sphere Method. Periodic monitoring, maintenance and testing of the switchyard lightning protection system includes the following activities:

- Lightning surge arresters are thermally scanned using infrared technology annually
- Lightning surge arresters are power factor tested during bus inspections and/or relay control scheme testing on a 10 year cycle

The 345 kV switchyard for Fermi 3 does not require any transformers for Fermi 3. Therefore, Fermi 3 switchyard transformer protection is not required.