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DTE Energy

10 CFR 54

January 15, 2015
NRC-15-0009

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

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) DTE Electric Company Letter to NRC, "Fermi 2 License Renewal Application," NRC-14-0028, dated April 24, 2014 (ML14121A554)

3) NRC Letter, "Requests for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 15 (TAC No. MF4222)," dated December 17, 2014 (ML14342A652)

Subject: Response to NRC Request for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 15

In Reference 2, DTE Electric Company (DTE) submitted the License Renewal Application (LRA) for Fermi 2. In Reference 3, NRC staff requested additional information regarding the Fermi 2 LRA. Enclosure 1 to this letter provides the DTE response to the request for additional information (RAI) except for RAI 4.2.6-1. The DTE response to RAI 4.2.6-1 will be provided separately as discussed in Reference 3. Enclosure 2 to this letter includes additional revisions to the LRA that have been identified as the result of feedback received from the NRC staff and due to a DTE corrective action document.

No new commitments are being made in this submittal. However, a revision has been made to a commitment previously identified in the LRA to inspect fire wrap and fire stop materials. The revised commitment is in Item 13 in LRA Table A.4 as indicated in the response to RAI 3.5.2-1 in Enclosure 1.

Additionally, the commitment date for Item 1 in LRA Table A.4 is being revised to be prior to March 31, 2016 as a result of feedback received from the NRC staff. The revised item is shown in Enclosure 2.

Should you have any questions or require additional information, please contact Lynne Goodman at 734-586-1205.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 15, 2015

Vito A. Kaminskas
Site Vice President
Nuclear Generation

Enclosures:
1. DTE Response to NRC Request for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 15
2. Additional License Renewal Application Revisions

cc: NRC Project Manager
NRC License Renewal Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Michigan Public Service Commission,
Regulated Energy Division (kindschl@michigan.gov)

Enclosure 1 to
NRC-15-0009

Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43

DTE Response to NRC Request for Additional Information
for the Review of the Fermi 2 License Renewal Application – Set 15

RAI 2.3.3.7-4

Background

License Renewal Application (LRA) Section 2.3.3.7, "Fire Protection – Water," acknowledges that fire damper housings mounted in ductwork that are needed for compliance with 10 CFR 50.48 are addressed in LRA Section 2.3.3.11, "Heating, Ventilation and Air Conditioning." LRA Tables 2.3.3-11 and 3.3.2-11 include the component type "damper housing" as a component subject to an aging management review (AMR), and list the intended function as "pressure boundary."

Table IX.B, "Selected Definitions & Use of Terms for Describing and Standardizing STRUCTURES AND COMPONENTS," of the Generic Aging Lessons Learned (GALL) Report defines "ducting and components" as including fire dampers. However, NUREG-1800, Revision 2, "Standard Review Plan for License Renewal Applications for Nuclear Power Plants" (SRP-LR) and the GALL Report do not differentiate between air control or air flow dampers and fire dampers that are needed for compliance with 10 CFR 50.48.

Issue

When fire dampers are tested, (e.g., in accordance with the Underwriters Laboratories' (UL) Standard 555), the entire fire damper assembly is tested, including the frame or sleeve to determine the hourly classification of the damper assembly.

Part 54 of 10 CFR, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," paragraph 54.4(a)(3), states that plant systems, structures, and components within the scope of this part are, "[a]ll systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48)." Paragraph 54.4(b) further states that "[t]he intended functions that these systems, structures, and components must be shown to fulfill in § 54.21 are those functions that are the bases for including them within the scope of license renewal as specified in paragraphs (a)(1) - (3) of this section."

If the fire damper assemblies are required for compliance with 10 CFR 50.48, then the appropriate intended function should be identified and maintained during the period of extended operation.

Request

State whether the fire damper assemblies form part of the plant fire barriers. If so, explain why fire damper assemblies have not been identified as fire barrier intended function in accordance with 10 CFR 54.4(b).

Response:

Fire damper assemblies form part of the plant fire barriers. Fire damper housings are within the scope of license renewal. Where the fire dampers are in a wall, they are covered as a structural component as discussed in the response to RAI 2.4.4-2. Where fire damper housings are in duct work, they are covered in the heating, ventilation and air conditioning (HVAC) systems as the component type "damper housing" as shown in License Renewal Application (LRA) Tables 2.3.3-11 and 2.3.3-12. As shown in LRA Tables 3.3.2-11 and 3.3.2-12, the effects of aging on damper housings are managed by the External Surfaces Monitoring Program and Internal Surfaces in Miscellaneous Piping and Ducting Components Program. This treatment is consistent with NUREG-1801, which includes housings for fire dampers in the category of "ducting and components." Damper housings within ductwork are not included in the scope of NUREG-1801 XI.M26, Fire Protection. Ducting is included in XI.M36, External Surfaces Monitoring of Mechanical Components, and XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.

As indicated in LRA Section 2.1.1, Fermi 2 scoping was performed on a system and structure basis. LRA Sections 2.3.3.11 and 2.3.3.12 both identify that the HVAC systems perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). This is one of the functions that is the basis for including the systems within the scope of license renewal. At the component level, fire damper housings are assigned the pressure boundary intended function. Managing the effects of aging to assure the pressure boundary function of the damper housings ensures that the fire dampers remain capable of supporting the fire protection system level function that was the basis for inclusion in the scope of license renewal.

LRA Revisions:

None.

RAI 2.4.4-2

Background:

LRA Section 2.3.3.7, "Fire Protection – Water," indicates that fire dampers mounted in walls, (for compliance with 10 CFR 50.48) are addressed in LRA Section 2.4.4, "Bulk Commodities," however, LRA Section 2.4.4 does not mention damper housings as a component type that is subject to an AMR. Similarly, LRA Section 2.4.2, "Water-Control Structures," "Residual Heat Removal Complex" subsection also refers to fire dampers in walls; however, LRA Table 2.4-2 does not include any damper housings as a component type subject to an AMR.

Table IX.B of the GALL Report defines "ducting and components" as including fire dampers. However, the SRP-LR and the GALL Report do not differentiate between air control or air flow dampers and fire dampers that are needed for compliance with 10 CFR 50.48.

Issue:

It is not clear to the staff if all fire damper assemblies in fire barriers (walls, ceiling, and floors) have been appropriately identified as a component type as being within the scope of license renewal and subject to an AMR.

Request:

Verify whether the fire damper assemblies mounted in fire barriers (i.e., not in HVAC ductwork) are within the scope of license renewal (e.g., in the residual heat removal complex) in accordance with 10 CFR 54.4(a) and whether they are subject to an AMR in accordance with 10 CFR 54.21(a)(1). If they are not within the scope of license renewal and are not subject to an AMR, please provide justification for the exclusion.

Response:

Fire damper assemblies mounted in fire barriers outside of heating, ventilation and air conditioning (HVAC) ductwork are within the scope of license renewal in accordance with 10 CFR 54.4(a) and are subject to aging management review (AMR) in accordance with 10 CFR 54.21(a)(1). The fire dampers perform an active function and are not subject to aging management review. The fire damper housings are passive long-lived components subject to aging management review. The fire damper housings are included with the component type "Fire protection components – miscellaneous steel including framing steel" with a fire barrier (FB) intended function as shown in License Renewal Application (LRA) Tables 2.4-4 and 3.5.2-4.

LRA Revisions:

None.

RAI B.1.18-1

Background:

LRA Section 2.3.3.7 acknowledges that dampers (housings) in ductwork that are needed for compliance with 10 CFR 50.48 are subject to an AMR, as documented in LRA Section 2.3.3.11.

Table IX.B of the GALL Report defines "ducting and components" as including fire dampers.

The SRP-LR includes AMR items for ducting and components and recommends the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components and the External Surfaces Monitoring Programs to manage for loss of material.

Issue:

During the aging management program (AMP) Audit, the staff noticed that the AMP Evaluation Report for Fire Protection, under the comparison statement for the "detection of aging effects" program element states that "[v]isual inspection by fire protection qualified personnel of the fire barrier walls, ceilings, floors, and doors, and other fire barrier materials, including fire barrier dampers, is performed at a frequency in accordance with the TRM [technical requirements manual]." DTE references two procedures for the test and inspection of fire dampers. These procedures state that visual inspections of the damper housings are conducted for cracks and evidence of corrosion every 18 months.

Consistent with the SRP-LR and the GALL Report, DTE selected the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components and the External Surfaces Monitoring Programs to manage for loss of material. It appears that the TRM requires inspection of the fire damper housings on a frequency of every 18 months. The staff is concerned that selection of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program may conflict with DTE's current requirement to inspect the fire damper housings every 18 months. The inspection frequency for the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is based on a sampling of at least 20 percent or maximum of 25 components every 10 years. The frequency and scope of this inspection is less than what is currently required by the TRM.

Request:

Explain why the frequency and number of fire damper housings to be inspected per the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is acceptable in light of the requirements in the TRM and its implementing procedures for fire damper housings.

Response:

Fermi 2 will continue to comply with the surveillance requirements established in the Technical Requirements Manual (TRM) Section TRSR 3.12.8.6 which requires visual inspection of each fire damper and associated hardware every 18 months. Where applicable and appropriate, inspections conducted to meet TRSR 3.12.8.6 will also be credited to meet inspection requirements of both the Internal Surfaces in Miscellaneous Piping and Ducting Components Program and the External Surfaces Monitoring Program.

LRA Revisions:

None.

RAI 3.5.2-1

Background:

Enhancement 2 in LRA Section B.1.18 states that procedures will be revised to require visual inspections of in-scope fire wrap and fire stop materials constructed of fibersil cloth, cerafoam, kaowool, Thermo-lag®, Flamemastic®, and Pyrocrete®.

Issue:

Section 54.21(a)(1) of 10 CFR requires that the integrated plant assessment identify and list the passive and long-lived structures and components subject to an AMR.

LRA Table 3.5.2-4 includes AMR items for fire stops and fire wraps constructed from carborundum durablanket, carborundum fibersil cloth, fiberboard, silicone elastomers, and Thermo-lag®. However, LRA Table 3.5.2-4 does not appear to include AMR items for cerafoam, kaowool, Flamemastic® or Pyrocrete®.

During the AMP Audit, the staff noted that, in the aging management review basis document for bulk commodities, the applicant uses carborundum durablankets, carborundum fibersil cloth, silicone fabric boot, silicone elastomers, and steel for fire stops and fire wraps.

There appears to be a discrepancy between the materials that are described in the enhancement and the materials apparently used at Fermi 2 for fire stops and fire wraps.

Request:

State whether cerafoam, kaowool, Flamemastic®, and Pyrocrete® are used as fire stops or fire wraps at Fermi 2. If so, state how the effects of aging of these components and materials will be managed. If AMR items for these components and materials do not already exist in the LRA, provide the appropriate revisions to the LRA.

Response:

The materials cerafoam, kaowool, Flamemastic®, and Pyrocrete® were not included in License Renewal Application (LRA) Section 3.5.2.1.4 or Table 3.5.2-4 because they were not identified during the LRA review of fire wrap and fire stop materials. The Fire Protection Program enhancement inadvertently included cerafoam, kaowool, Flamemastic®, and Pyrocrete® as fire wrap and fire stop materials.

The associated Fire Protection Program enhancement will be revised to remove the listing of specific materials. The revised enhancement ensures that all fire wrap and fire stops that perform a license renewal intended function will be inspected, regardless of the specific material. The LRA will be revised as indicated below.

LRA Revisions:

LRA Sections A.1.18, A.4, and B.1.18 are revised as shown on the following pages. Additions are shown in underline and deletions are shown in strike-through.

A.1.18 Fire Protection Program

The Fire Protection Program will be enhanced as follows.

- Revise Fire Protection Program procedures to require visual inspections of in-scope (a) fire wrap and fire stop materials ~~constructed of fibersil cloth, cerafoam, kaowool, thermolag, flamemastic, and pyrocrete~~ for loss of material, change in material properties, cracking/delamination, separation, increased hardness, shrinkage, and loss of strength; (b) carbon steel penetration sleeves for loss of material; (c) steel framing, roof decking, and floor decking for loss of material; (d) concrete fire barriers including manways, manhole covers, handholes, and roof slabs for loss of material and cracking; and (e) railroad bay airlock doors for loss of material. Inspections are performed at a frequency in accordance with the NRC-approved fire protection program or at least once every refueling cycle.

A.4 LICENSE RENEWAL COMMITMENT LIST

No.	Program or Activity	Commitment	Implementation Schedule	Source
13	Fire Protection	Enhance Fire Protection Program as follows: b. Revise Fire Protection Program procedures to require visual inspections of in-scope– • Fire wrap and fire stop materials ~~constructed of fibersil cloth, cerafoam, kaowool, thermolag, flamemastic, and pyrocrete~~ for loss of material, change in material properties, cracking/delamination, separation, increased hardness, shrinkage, and loss of strength. • Carbon steel penetration sleeves for loss of material. • Steel framing, roof decking, and floor decking for loss of material. • Concrete fire barriers including manways, manhole covers, handholes, and roof slabs for loss of material and cracking. • Railroad bay airlock doors for loss of material. Inspections are performed at a frequency in accordance with the NRC-approved fire protection program or at least once every refueling cycle.	Prior to September 20, 2024.	A.1.18

B.1.18 FIRE PROTECTION

Enhancements

Element Affected	Enhancement
4. Detection of Aging Effects	Revise Fire Protection Program procedures to require visual inspections of in-scope (a) fire wrap and fire stop materials ~~constructed of fibersil cloth, cerafoam, kaowool, thermolag, flamemastic, and pyrocrete~~ for loss of material, change in material properties, cracking/delamination, separation, increased hardness, shrinkage, and loss of strength; (b) carbon steel penetration sleeves for loss of material; (c) steel framing, roof decking, and floor decking for loss of material; (d) concrete fire barriers including manways, manhole covers, handholes, and roof slabs for loss of material and cracking; and (e) railroad bay airlock doors for loss of material. Inspections are performed at a frequency in accordance with the NRC-approved fire protection program or at least once every refueling cycle.

RAI 3.5.2.78-1

Background:

LRA Table 3.5.1, item 3.5.1-78, states that the "Steel components: spent fuel pool liner" is managed for loss of material and cracking by the Water Chemistry Program and monitoring of the leak chase channel drainage system in accordance with technical specifications. LRA Table 3.5.2-1 includes several stainless steel components exposed to a fluid environment that do not line the spent fuel pool and which reference item 3.5.1-78, note E, to manage loss of material. These components include the reactor cavity liner, refueling bellows, and skimmer surge tank. The staff also noted that monitoring of the leak chase channel drainage system is not performed on AMR items in LRA Table 3.5.2-1 that reference 3.5.1-78, note E.

LRA Table 3.0-2 defines a fluid environment as containing either raw water or treated water and includes the following GALL Report environments: ground water, treated water, treated water greater than 140°F, flowing water, and standing water.

For stainless steel exposed to treated water greater than 140°F, the GALL report recommends AMP XI.M2, "Water Chemistry," to manage cracking due to stress corrosion cracking and AMP XI.M32, "One-Time Inspection," to verify the effectiveness of the Water Chemistry Program.

Issue:

It is unclear to the staff if appropriate activities to verify the effectiveness of the Water Chemistry Program are being performed for the components in LRA Table 3.5.2-1 that reference AMR item 3.5.1-78. It is also unclear to the staff if the aging effect of cracking is being managed for stainless steel components exposed to a fluid environment that reference AMR item 3.5.1-78.

Request:

(1) Provide clarification on how the effectiveness of the Water Chemistry Program is being verified for items that reference 3.5.1-78, note E, in LRA Table 3.5.2-1.
(2) State the basis for why the aging effect of cracking is not being managed for AMR items that reference 3.5.1-78.

Response:

1. The One-Time Inspection Program verifies effectiveness of the water chemistry program as indicated in License Renewal Application (LRA) Section B.1.43, Water Chemistry Control – BWR Program, and Section B.1.33, One-Time Inspection Program. The One-Time Inspection Program includes inspection of a sample consisting of 20 percent of the components in each material-environment-aging effect group up to a maximum of 25

components. This encompasses the material-environment-aging effect group that includes the components in LRA Table 3.5.2-1 that reference line 3.5.1-78 of LRA Table 3.5.1.

2. In LRA Table 3.5.2-1, the stainless steel components which reference line 3.5.1-78 credit the Water Chemistry Control – BWR Program, which as discussed above, invokes the One-Time Inspection Program to verify effectiveness. These stainless steel components are exposed to treated water at less than 140°F, which is an environment not conducive to stress corrosion cracking (SCC). As indicated in NUREG-1801 (GALL Report) Chapter IX, Section D, 140°F is the temperature threshold for SCC in stainless steel. Chapter IX, Section D also indicates that SCC has been observed in stagnant, oxygenated borated water systems at lower temperatures than the 140°F threshold, but that all such instances entailed a significant presence of contaminants. The Water Chemistry Control – BWR Program precludes a significant presence of contaminants in treated water. Therefore, cracking due to SCC is not an aging effect requiring management for the AMR items in LRA Table 3.5.2-1 that reference line 3.5.1-78 of LRA Table 3.5.1. Nevertheless, the same aging management programs that NUREG-1801 recommends for managing cracking of stainless steel exposed to treated water greater than 140°F are invoked for these components in the Fermi 2 LRA.

LRA Revisions:

None.

RAI 3.3.2.3-1

Background:

In LRA Table 3.3.2-9, the applicant identifies that loss of material is an applicable aging effect for the following diesel generator piping components or elements that are exposed to an internal diesel exhaust environment: (a) bellows, (b) housings, (c) liners, and (d) tubes. The applicant stated that LRA AMP B.1.24, "Internal Surfaces in Miscellaneous Piping and Ducting Components," will be used to manage loss of material in these components. In LRA Table 3.3.2-10, the applicant identified that stainless steel expansion joints exposed internally to diesel exhaust gas and subject to cracking due to fatigue will be managed using the metal fatigue time-limited aging analyses (TLAA).

AMR item VII.H2.AP-104 in the GALL Report, identifies that stainless steel diesel engine exhaust piping, piping components, and piping elements that are exposed to a diesel exhaust environment may be susceptible to loss of material due to pitting and crevice corrosion. This AMR item states that GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," will be used to manage loss of material due to pitting and crevice corrosion in the components.

Issue:

It is unclear to the staff why loss of material due to pitting and crevice corrosion is not an applicable aging effect requiring management for the stainless steel expansion joints exposed to an internal diesel exhaust environment.

Request:

Justify why loss of material due to pitting and crevice corrosion is not an applicable aging effect requiring management for the stainless steel expansion joints exposed to diesel exhaust gas. Otherwise, provide appropriate justification of how loss of material due to pitting and crevice corrosion will be managed in these components during the period of extended operation.

Response:

As noted in Appendix D Table 4-1 of EPRI TR-1010639, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 4, susceptibility to pitting and crevice corrosion for stainless steel in an air/gas environment requires the presence of three conditions, including a wetted surface and potential for concentrating contaminants. The stainless steel emergency diesel generator (EDG) exhaust expansion joints are oriented vertically, which precludes the potential for moisture collection necessary to concentrate contaminants. Thus, loss of material due to pitting and crevice corrosion is not an applicable aging effect for the stainless steel EDG exhaust expansion joints.

LRA Revisions:

None.

RAI 3.3.1.83-1

Background:

In LRA Table 3.0-1, the applicant identified that components in the emergency diesel exhaust system are exposed to an internal diesel exhaust environment which is comprised of gases, fluids, and particulates present in diesel exhaust. LRA Table 3.3.1, AMR item 3.3.1-83, states that stainless steel piping, piping components, and piping elements exposed to this internal environment are not subject to a stress corrosion cracking effect/mechanism because the "configuration of stainless steel diesel engine exhaust components precludes moisture collection necessary to concentrate contaminates."

SRP-LR Table 3.3-1, AMR item 83, states that stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust are susceptible to cracking due to stress corrosion cracking, and should be managed by the "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" AMP.

Issue:

It is unclear how the exhaust gas (internal) environment described in the LRA is different from the exhaust gas environment in the GALL Report. Therefore, it is unclear to the staff why cracking induced by a stress corrosion cracking mechanism is not an applicable aging effect requiring management for those stainless steel diesel exhaust piping, piping components, and piping elements that are exposed to a diesel exhaust environment.

Request:

Justify why cracking due to stress corrosion cracking is not an applicable aging effect requiring management for the diesel exhaust piping, piping components, and piping elements that are made from stainless steel and are exposed to a diesel exhaust environment. Otherwise, clarify how cracking due to stress corrosion cracking will be managed in these components during the period of extended operation.

Response:

As noted in Appendix D Table 4-1 of EPRI TR-1010639, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 4, susceptibility to stress corrosion cracking (SCC) for stainless steel in an air/gas environment requires the presence of four conditions: gas that is not dried air, N_2, CO_2, H_2, halon, or fluorocarbons; and component subject to wetted environment; and a potential for concentrating contaminants; and temperature > 140°F.

Eight emergency diesel generator (EDG) system stainless steel components are exposed to a diesel exhaust environment. These eight components are expansion joints; two are located in each of the four EDG exhaust lines. These eight expansion joints are each mounted in a vertical

direction which precludes accumulation of liquids and, in turn, the potential for concentrating contaminants. Because the four criteria identified in the EPRI document are not met, cracking due to stress corrosion cracking is not an aging effect requiring management.

LRA Revisions:

None.

RAI 3.3.2.3.8-1

Background:

LRA Table 3.3.2-8 states that for Teflon® flex connections exposed externally to indoor air and internally to gas, there is no aging effect and no proposed AMP. The AMR items cite generic note F.

Issue:

The staff cannot find the applicant's proposal acceptable based on its review of:

- *National Aeronautics and Space Administration (NASA) Technical Memorandum 105753, "High Temperature Dielectric Properties of Apical, Kapton, Peek, Teflon® AF, and Upilex Polymers," A N Hammoud, 1992, Table 1, which states that Teflon® can handle long term temperatures up to 285 °C; however, there are studies which demonstrate that certain grades of Teflon® degrade when exposed to radiation.*
- *PTFE [Teflon®] Expansion Joint Engineering Guide, 2200, Ethylene LLC, Kentwood, MI, www.ethylene.com, which states that the service life of Teflon® flexible connections will be reduced if it is subject to scratching, abrasion, and weld splatter.*
- *Dupont Teflon® PTFE fluoropolymer resin Properties Handbook, http://www.rjchase.com/ptfe_handbook.pdf, which states that Teflon®-based products are susceptible to creep.*

The staff lacks sufficient information to conclude that the radiation levels are low enough in the vicinity of the flex connections. In addition, although external scratching, abrasion, and weld splatter could be considered as event-driven, these mechanisms can occur in the power plant environment as a matter of course. Further, the staff lacks sufficient information to conclude that with creep, the material will retain sufficient material properties throughout the period of extended operation.

Request:

State the following:

(1) the specific Teflon® material type for these flexible connections
(2) the basis why there are no aging effect requirement management and no proposed AMP;
(3) if the specific Teflon® material type is susceptible to aging, state how the aging effects will be managed.

Response:

1. Because the following discussion applies to all grades of Teflon material, it is not necessary to cite a specific Teflon material type.

2. The expected cumulative radiation is less than 10^4 rads. The threshold for aging effects associated with gamma radiation for fluoropolymers for all grades of Teflon is greater than 10^4 rads.

   Scratching, abrasion, and weld splatter are mechanical damage mechanisms rather than aging mechanisms. Nevertheless, this flexible connector with a Teflon liner is protected by a stainless steel wire braid cover, fitted on each end with a swivel flare nut. The stainless steel wire braid cover provides protection for scratching, abrasion, and weld splatter.

   The flexible connector is pressurized only to actuate the Halon system and is, therefore, normally depressurized. Because the flexible connector is not exposed to long term stress, it is not susceptible to creep.

   Thus, there are no aging effects requirement management for this flexible connection.

3. No aging effects requiring management were identified.

LRA Revisions:

None.

RAI 3.3.2.3.12-1

Background:

LRA Table 3.3.2-12 states that for graphite rupture discs exposed externally to indoor air and internally to gas, there is no aging effect and no proposed AMP. The AMR items cite generic note F.

Issue:

During the audit, the staff reviewed plant-specific drawings and identified that the graphite rupture discs exposed externally to indoor air and internally to gas are Mersen Bursting Discs constructed of GRAPHILOR® material. The staff reviewed the supplier's website, https://www.mersen.com/en/products/anticorrosion-and-process-equipment/graphilor-bursting-discs.html. The website states, "GRAPHILOR® a resin-impregnated graphite developed and patented by Mersen, is virtually impervious to most corrosive liquids and vapours within its temperature/pressure rating. GRAPHILOR® is a unique material insensitive to thermal shock." The staff lacks sufficient info to justify not conducting inspections given the 60-year life of the rupture disc.

Request:

State the basis for not conducting inspections of the rupture disc material during the period of extended operation.

Response:

The rupture discs are routinely replaced every 8 years during the disassembly, inspection, and reassembly of the control center heating ventilation and air conditioning (CCHVAC) chiller. Since these components are subject to replacement based on a specified time period they are not subject to aging management review in accordance with 10 CFR 54.21(a)(1)(ii). The License Renewal Application (LRA) will be revised to remove the rupture disc line items.

LRA Revisions:

LRA Section 3.3.2.1.12 and LRA Tables 2.3.3-12 and 3.3.2-12 are revised as shown on the following pages. Additions are shown in underline and deletions are shown in strike-through.

Table 2.3.3-12
Control Center HVAC System
Components Subject to Aging Management Review

Component Type	Intended Function
~~Rupture disc~~	~~Pressure boundary~~

3.3.2.1.12 Control Center Heating, Ventilation and Air Conditioning System

Materials

Control center heating, ventilation and air conditioning system components are constructed of the following materials.

- Aluminum
- Carbon steel
- Copper alloy
- Copper alloy > 15% zinc or > 8% aluminum
- Fiberglass
- Glass
- ~~Graphite~~
- Stainless steel

Table 3.3.2-12
Control Center Heating, Ventilation and Air Conditioning System
Summary of Aging Management Evaluation

Table 3.3.2-12: Control Center Heating, Ventilation and Air Conditioning System								
Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
~~Rupture disc~~	~~Pressure boundary~~	~~Graphite~~	~~Air – indoor (ext)~~	~~None~~	~~None~~	~~–~~	~~–~~	~~F~~
~~Rupture disc~~	~~Pressure boundary~~	~~Graphite~~	~~Gas (int)~~	~~None~~	~~None~~	~~–~~	~~–~~	~~F~~

RAI 3.4.2.3.3-7-1

Background:

LRA Table 3.4.2-3-7 states that for plastic piping internally exposed to raw water, there is no aging effect and no proposed AMP. The AMR item cites generic note F.

Issue:

During the audit, the staff reviewed plant-specific drawings and identified that the plastic piping exposed to raw water in LRA Table 3.4.2.3-7 is constructed of polyvinyl chloride (PVC). The staff noted that PVC Pipe – Design and Installation – Manual of Water Supply Practices, M23, American Water Works Association, Second Edition, 2002, Appendix A, "Chemical Resistance Tables," lists PVC as generally resistant to chemicals up to 140 degrees F, such as bleach (12.5 percent active chlorine), potassium hydroxide, sodium hydroxide, kerosene, hydrochloric acid, hydrogen peroxide (90 percent), sea water, soaps, and sulfuric acid (70 percent). Given that the PVC piping is located in the circulating water system, it is not clear to the staff whether chlorine is present in the PVC piping and at what levels.

Request:

State whether chlorine is injected into the circulating water system. If chlorine is injected, state the percent of active chlorine that would be present in the PVC piping; and if the free chlorine exceeds 12.5 percent, state how aging of the PVC pipe will be managed.

Response:

Chlorine is injected into the circulating water system. The polyvinyl chloride (PVC) piping is installed in the normally isolated circulating water drain down system which is used during plant outages to facilitate condenser maintenance. Typically, the chlorine injection system is isolated prior to a plant shutdown and the active and free chlorine levels are negligible when the circulating water drain down system is placed in service. Regardless, assuming that the drain down system is constantly exposed to the circulating water environment, the active (total) chlorine level is approximately 3-4 parts per million (ppm) and the free chlorine level is approximately 2 ppm. These chlorine levels are significantly less than 12.5 percent.

LRA Revisions:

None.

RAI 4.2.5-1

Background:

In LRA Section 4.2.5, "Reactor Vessel Circumferential Weld Relief," and LRA Table 4.2-6, the applicant provided its TLAA for the calculation of the mean adjusted reference temperature value (i.e., mean RT_{NDT} value) of the limiting circumferential weld (i.e., weld 1-313, as made from heat No. 10137) in the beltline of the reactor pressure vessel (RPV), as assessed to the end of the period of extended operation (i.e., 52 effective full power years [EFPY]).

LRA Section B.1.38 provides the applicant's Reactor Vessel Surveillance Program. The LRA states that the AMP is based on implementation of the Integrated Surveillance Program (ISP) that was approved by the staff in Electric Power Research Institute (EPRI) Boiling Water Reactor Vessel and Internals Program (BWRVIP) Technical Report (TR) No. BWRVIP-86-A, Revision 1, and that the AMP relies on the surveillance data obtained from specific RPV surveillance materials in ISP host reactors that are representative of materials in the base metal and weld components of the Fermi 2 RPV.

Issue:

LRA Table 4.2-6 does not include a corresponding mean RT_{NDT} analysis for RPV lower shell-to lower intermediate shell circumferential weld 1-313 (heat No. 10137) that is based on ISP surveillance data for this weld component, and uses Section 5.2 of TR BWRVIP-86-A, Revision 1, for the chemistry factor (CF) and ΔRT_{NDT} values used in the mean RT_{NDT} analysis.

Request:

Clarify whether the surveillance weld materials from the host reactors representing Fermi 2 in the EPRI BWRVIP ISP (i.e., the BWRVIP-86-A, Revision 1, program) are a match to the weld heat for RPV lower shell-to-lower intermediate shell circumferential weld 1-313 (i.e., heat No. 10137). If so, provide the basis why LRA Table 4.2-6 does not include an additional mean RT_{NDT} calculation for this circumferential weld using: (a) the applicable ISP surveillance weld data from the host reactors, and (b) the methodology in Section 5.2 of TR No. BWRVIP-86-A, Revision 1, for calculating the CF and ΔRT_{NDT} values in the mean RT_{NDT} calculation from the applicable ISP surveillance weld data. If the surveillance weld materials from the host reactors do not match the heat for RPV circumferential weld 1-313, clarify how the ISP surveillance weld data from the host reactors supports the adequacy of the predicted ΔRT_{NDT} value used in the mean RT_{NDT} calculation for RPV circumferential weld 1-313.

Response:

The surveillance weld materials from the host reactors representing Fermi 2 in the BWRVIP Integrated Surveillance Program (ISP) <u>are not</u> a match to the weld heat for RPV lower shell-to-lower intermediate shell circumferential weld 1-313. Weld surveillance data is not used to

support the adequacy of the predicted ΔRT_{NDT} value used in the mean RT_{NDT} calculation for RPV circumferential weld 1-313. The circumferential weld is not the limiting beltline material, and it is not selected as the Fermi 2 representative material for implementation of the ISP. Materials for the ISP were specifically chosen to best represent the limiting plate/weld materials for each plant using specimens from the entire BWR fleet. It is consistent with BWRVIP guidelines (BWRVIP-86 Rev 1-A) that every RPV weld is not represented in the ISP. RPV axial welds 2-307A, B, & C are considered the limiting beltline material and surveillance weld materials from host reactors representing Fermi 2 in the BWRVIP ISP are a match to these welds. The projected increase in reference temperature without margin and mean adjusted reference temperature (ART) using the ISP data for the limiting beltline welds will be provided in response to RAI 4.2.6-1 (part of RAI Set 15 that will be provided separately as discussed in the cover letter).

LRA Revisions:

None.

RAI 4.2.5-2

Background:

Section 50.55a(g)(4) of 10 CFR and Table IWB-2500-1 of the ASME Code Section XI require the applicant to perform volumetric inspections of the RPV circumferential welds once every 10-year inservice inspection (ISI) interval, unless a relief request proposing alternatives to these requirements is requested and approved for the current licensing basis (CLB) in accordance with 10 CFR 50.55a(a)(3). The applicant provided a time-dependent 40-year conditional probability of failure and mean RT_{NDT} analysis for the RPV circumferential welds in the CLB to support the staff approval of an ISI relief request (ML003693720) for the welds in accordance with 10 CFR 50.55a(a)(3). The NRC approved this relief request, and the supporting analysis, by safety evaluation (SE) dated January 27, 2000 (ML003673501). This SE granted authorization to eliminate the volumetric inspections of the RPV circumferential welds for the remainder of the current licensed operating period.

In LRA Section 4.2.5, "Reactor Vessel Circumferential Weld Relief," and LRA Table 4.2-6, the applicant provides its conditional probability of failure and mean RT_{NDT} analysis (a TLAA) for the RPV circumferential welds through 52 effect full power years of operation. The TLAA is based on the staff-approved guidelines in EPRI BWRVIP TR No. BWRVIP-05, which was approved in a safety evaluation to the EPRI BWRVIP main committee dated July 28, 1998 (ADAMS Legacy Library Accession Nos. ML98080037 and ML98080041), as supplemented in the SE of March 7, 2000 (ML003690281). The applicant stated that it will submit a relief request for these welds for the period of extended operation and that this is an acceptable basis for accepting this TLAA in accordance with 10 CFR 54.21(c)(1)(iii).

Issue:

Consistent with Section 4 of the staff's SE on the BWRVIP-05 report, LRA Section 4.2.5 states that examinations of the RPV circumferential welds will be performed if the examinations of the RPV axial welds "reveal an active mechanistic mode of degradation." LRA Section 4.7.5 provides the applicant's plant-specific TLAA for flaws that were detected in the Fermi 2 RPV and the basis for accepting this TLAA in accordance with 10 CFR 54.21(c)(1)(ii). LRA Sections 4.2.5 and 4.7.5 do not indicate whether the RPV flaws evaluated in LRA Section 4.7.5 were flaws in the RPV fabrication welds or whether the RPV flaws were initiated or are growing as the result of an active mechanistic mode of degradation (i.e., as a result of an age-related initiation or growth mechanism). Therefore, the staff needs additional information to make its determination on whether: (a) the TLAA may be accepted in accordance with 10 CFR 54.21(c)(1)(iii), and (b) a relief request for these RPV circumferential welds may be submitted for the period of extended operation in accordance with 10 CFR 50.55a(a)(3).

Request:

Clarify whether the RPV flaws discussed in LRA Section 4.7.5 were detected in an RPV fabrication weld and whether the flaws had initiated or are currently growing as a result of an active degradation mechanism. If the RPV flaws were initiated or are growing by an active degradation mechanism, justify why the TLAA on the Reactor Vessel Circumferential Weld Relief may be used to support submittal of a BWRVIP-05 based relief request for the period of extended operation (i.e., in accordance with 10 CFR 50.55a(a)(3)) such that the TLAA may be accepted in accordance with 10 CFR 54.21(c)(1)(iii).

Response:

The reactor pressure vessel (RPV) flaws discussed in License Renewal Application (LRA) Section 4.7.5 were detected in an RPV fabrication weld. The flaws are fabrication flaws, i.e., slag deposits that resulted during the welding process. The flaw causes and morphology are described in Materials Reliability Program Document MRP-124 (Vertical Progression Welding Performed by Combustion Engineering and General Electric Co. Service Information Letter SIL-651 (Upjohn/Subvert Weld Flaws)). These flaws were not initiated because of any service condition and do not have an active degradation mechanism. The flaws are entirely subsurface and were evaluated by a detailed fracture mechanics analysis to not be susceptible to flaw growth. Repeated examination of these flaws has confirmed that there has been no flaw growth.

LRA Revisions:

None.

Enclosure 2 to
NRC-15-0009

Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43

Additional License Renewal Application Revisions

Additional revisions to the License Renewal Application (LRA) were identified. The purpose of the revisions is discussed below. These revisions are shown on the following pages. Additions are shown in underline and deletions are shown in strike-through.

1) The implementation date for Table A.4, Item 1 is changed to "Prior to March 31, 2016" per the NRC request that this be implemented prior to the renewed license being issued.

2) LRA Section 3.3.2.1.15 and LRA Table 3.3.2-15 are revised because the material of the orifice listed in the emergency diesel generator (EDG) fuel oil system has been determined to be stainless steel, not aluminum. The EDG fuel oil system fuel manifold return line restrictive orifice is integral with the stainless steel check valve poppet. The valve body is copper alloy, which is already listed in the section and table. Stainless steel is already listed as a material in Section 3.3.2.1.15. The section and table are revised to remove the aluminum material and to update the orifice material to be stainless steel, its internal and external environment to both be fuel oil, and to remove the pressure boundary function.

3.3.2.1.15 Fuel Oil Systems

Materials

Fuel oil system components are constructed of the following materials.

- ~~Aluminum~~
- Carbon steel
- Copper alloy
- Stainless steel

Table 3.3.2-15
Fuel Oil Systems
Summary of Aging Management Evaluation

Table 3.3.2-15 Fuel Oil Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Orifice	~~Pressure boundary~~ Flow control	~~Aluminum~~ Stainless steel	~~Air—indoor~~ Fuel oil (ext)	~~None~~ Loss of material	~~None~~ Diesel Fuel Monitoring	~~VII.J.AP-135~~ VII.H1.AP-129	~~3.3.1-113~~ 3.3.1-71	A, 303
Orifice	~~Pressure boundary~~ Flow control	~~Aluminum~~ Stainless steel	Fuel oil (int)	Loss of Material	Diesel Fuel Monitoring	VII.H1.AP-129	3.3.1-71	A, 303

A.4 LICENSE RENEWAL COMMITMENT LIST

No.	Program or Activity	Commitment	Implementation Schedule	Source
1	Operating Experience Review	DTE will make the following changes to the process for operating experience review (OER). a. Procedures will be revised to add an aging type code to Corrective Action Program documents that describe either plant conditions related to aging or industry operating experience related to aging. b. Procedures will be revised to provide for training of personnel responsible for submitting, screening, assigning, evaluating, or otherwise processing plant-specific and industry operating experience concerning age-related degradation and aging management, as well as for personnel responsible for implementing AMPs, based on the complexity of the job performance requirements and assigned responsibilities. c. Procedures will be revised to specify that evaluations of operating experience concerning age-related degradation will include consideration of the affected systems, structures or components, the environments, materials, aging effects, aging mechanisms, and aging management programs.	~~Within 6 months after issuance of the renewed license.~~ Prior to March 31, 2016.	A.1