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DTE Energy

10 CFR 54

June 18, 2015
NRC-15-0067

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 35 (TAC No. MF4222)," dated May 21, 2015 (ML15134A072)

4) DTE Electric Company Letter to NRC, "Response to NRC Request for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 25," NRC-15-0032, dated April 17, 2015 (ML15107A408)

Subject: Response to NRC Request for Additional Information <u>for the Review of the Fermi 2 License Renewal Application – Set 35</u>

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). Enclosure 2 to this letter provides a revised response to Set 25 RAI B.1.16-2a as discussed with the NRC during clarification calls on May 14 and 28, 2015. The response to RAI B.1.16-2a was previously provided in Reference 4.

No new commitments are being made in this submittal. However, revisions have been made to commitments previously identified in the LRA. The revised commitments are in LRA Table A.4 Item 11, External Surfaces Monitoring, as indicated in the response to RAI B.1.16-2a 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 June 18, 2015

Wayne A. Colonnello
Director Nuclear Work Management
For Vito A. Kaminskas

Enclosures:
1) DTE Response to NRC Request for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 35
2) DTE Revised Response to NRC Request for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 25 Question B.1.16-2a

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-15-0067

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 35

Set 35 RAI 4.3.3-1a

Background

By letter dated January 14, 2015, the staff issued Request for Additional Information (RAI) 4.3.3-1 requesting that the applicant:

(1) Provide the methodology being used to identify plant-specific component locations in the reactor coolant pressure boundary that are more limiting than the components identified in NUREG/CR-6260.

(2) Provide the technical basis used to determine that the methodology used to identify the plant-specific component locations are bounding.

In its response dated February 12, 2015, the applicant stated that:

(1) Electric Power Research Institute (EPRI) Technical Report 1024995, "Environmentally Assisted Fatigue Screening, Process and Technical Basis for Identifying EAF Limiting Locations," is the methodology that will be used to identify plant-specific component locations that are more limiting than the locations identified in NUREG/CR-6260.

(2) EPRI Technical Report 1024995, Section 3, provides the technical basis for the methodology to identify the limiting plant-specific component locations.

Section 3 of EPRI Technical Report 1024995 states: "The reader is reminded that this report is NOT provided as a Quality Assured document. Application of the processes described will require appropriate review and quality dedication on a site-specific basis."

Section 4 of EPRI Technical Report 1024995 contains a subsection entitled "Guidelines for Reducing the Number of Sentinel Locations." This subsection provides possible criteria that could be used to make judgements regarding the reduction of sentinel locations. Section 6 also states that analysis beyond the scope of the screening process presented may be applied to further reduce the number of sentinel locations.

Issue

EPRI Technical Report 1024995 has not been submitted to the NRC for approval and has not been endorsed by the NRC. Additionally, EPRI Technical Report 1024995 is not a Quality Assured document and its application requires plant-specific review. The criteria used to reduce the number of sentinel locations are not clearly defined. The applicant has not demonstrated that its application of the screening methodology will be done in a manner that conservatively evaluates environmentally assisted fatigue (EAF) effects, with the same degree of analytical rigor for all locations, to identify the bounding locations.

The staff lacks sufficient information to evaluate the effects of the reactor coolant environment on component fatigue life during the period of extended operation. It is unclear to the staff if the plant-specific implementation of the generic procedures in EPRI Technical Report 1024995 will identify the most limiting plant-specific locations.

<u>Request</u>

(1) *Describe and justify the site-specific review that was conducted to determine that the application of the screening processes being utilized is appropriate for identifying the EAF limiting locations.*

(2) *Select a number of representative systems and provide the evaluation of the EAF analysis, ranking of sentinel locations, and selection of limiting sentinel locations. The systems should be selected so that they demonstrate the adequacy of the methodology to identify the limiting plant-specific component locations. Consideration should be given to the thermal zones, materials, transients, and complexity of the systems selected. The systems selected should demonstrate that the methodology conservatively evaluates EAF effects, with the same degree of analytical rigor for all locations, to identify the bounding locations.*

(3) *Describe and justify any engineering judgement, plant-specific assumptions, and plant-specific criteria used in the EAF analysis or screening process. This should include the systematic process used to eliminate sentinel locations as limiting and examples showing how the process was implemented.*

Response:

1) Fermi 2 has an ASME Section III design basis for Class 1 vessels and piping. Therefore, these components have calculated cumulative usage factors (CUFs). Fermi 2 utilized the EPRI Technical Report 1024995 guidelines for identifying Sentinel locations for a plant with an ASME Section III Subsection NB-3000 vessel and piping design basis. As noted in Section 2 of the EPRI report, *"Evaluating components with a CUF calculation is straightforward and may require a relatively simple evaluation process to estimate and apply environmental fatigue correction factors (F_{en}) to the existing CUF values."* The main reason for this relative simplicity is that usage has been calculated and can be recalculated in a straightforward manner using fatigue curves from the applicable NUREG for estimating EAF.

   The design stress analysis results for Fermi 2 were previously reanalyzed for power uprate conditions, with updated CUFs for 60 years provided in LRA Table 4.3-2 (Reactor Pressure Vessel), LRA Table 4.3-4 (Reactor Recirculation Pumps), LRA Table 4.3-6 (Class 1 Piping), and LRA Table 4.3-7 (Class 1 Valves). Each component location was examined and the location with the largest CUF was identified in each subsystem in the fatigue analysis. The calculations documenting the evaluation of the candidate locations evaluated these locations

for EAF. The evaluations were performed under the auspices of a 10 CFR 50 Appendix B quality assurance program. Therefore, the screening process used for Fermi 2 is robust and comprehensive.

2) The Feedwater (FW) system and Standby Liquid Control (SLC) system are the systems selected as representative systems.

FW System

The FW system was divided into subsystems for the purpose of this screening process; nozzle, piping inside containment, containment penetration and piping outside containment. The piping and containment penetration material is carbon steel, the nozzle is low alloy steel, and the safe end is stainless steel.

The design stress analysis results were examined and the location with the largest CUF was identified in each subsystem. These locations had been reanalyzed for power uprate conditions and, as indicated in LRA Section 4.3, 60-year projected cycles. The results obtained from the process for evaluating Sentinel locations for the FW system are provided in Table 1 of this response.

As can be observed from the notes on Table 1, the same degree of analytical rigor was not always applied. Therefore, the approach used at Fermi 2 took this into account when selecting Sentinel locations and is why some Sentinel locations with currently lower calculated CUF values were selected (e.g., FW piping FW-04 Node 16 instead of the penetration body – see Table 1 Notes 1, 2 & 9). Alternating stress and fatigue usage is highest where large, rapid temperature changes occur (e.g., FW nozzle and FW-04 Node 16 where FW, RCIC and RWCU systems converge), validating the selection of these locations as Sentinel locations.

SLC System

The SLC piping both outside and inside containment up to the nozzle was evaluated for EAF, as well as its associated nozzle (core ΔP nozzle). The core ΔP nozzle is not one of the NUREG/CR-6260 locations, but was determined to be a Sentinel location based on its CUF_{en} value. The results are provided in Table 2 of this response.

Node 55 is the highest fatigue location in the piping system with a 60-year CUF value of 0.097. Node 95 is the highest fatigue location in the piping outside containment with a 60-year CUF value of 0.056. The CUF_{en} value for Node 55 is 0.503. The nozzle through which the SLC fluid enters the RPV is the core ΔP nozzle, whose 60-year CUF value is 0.637 with a calculated CUF_{en} value of 1.478. The core ΔP nozzle thus bounds the piping and will serve as a Sentinel location. Although a NB-3200 analysis was performed for the core ΔP nozzle, the calculated 60 year usage was conservatively calculated by combining the transients and evaluated using the alternating stress for the most limiting transient case. It is anticipated that further analytical work will be performed in the future to demonstrate that the computed CUF_{en} value of the core ΔP nozzle is acceptable. This may result in Node 55 being

identified as an additional Sentinel location if the CUF_{en} value is within 50% of the core ΔP nozzle CUF_{en} value.

Table 1: CUF Values from LRA and CUF_{en} Values Using 60-year Cycle Projections – FW System

			ASME Fatigue Curve		NUREG/CR-6909 Fatigue Curve and F_{en}		
Identifier	Location	Material	Node	CUF (60-year cycles)	CUF (60-year cycles)	CUF_{en} (60-year cycles)	Sentinel Location
FW Nozzle	Blend Radius/Nozzle-Vessel Intersection	LAS	N/A	0.058	0.036	0.115	Y(3)
	Safe-End	SS	N/A	0.585	0.664	6.366(10)	Y(3)
	Safe-End/Nozzle End	CS	N/A	0.267	0.087	0.165	Y(3)
FW-01	Piping inside containment	CS	40	0.071	0.026	0.049	N(4,5)
FW-02	Piping inside containment	CS	40	0.101	0.037	0.070	N(4,5)
FW-04	Piping outside containment	CS	16	0.192(1,5)	N/C(6)	N/C(6)	Y(3)
	Piping outside containment	CS	16	0.003(2)	0.0003	0.0012	
FW-05	Piping outside containment	CS	305	0.010(5)	Bounded by FW-04(7)		N(4)
Penetrations	X-9A weld(8)	CS	N/A	0.047	0.016	0.029	N(4)
	X-9B weld(8)	CS	N/A	0.096	0.033	0.062	N(4)
	X-9A/B body(9)	CS	N/A	0.471	0.208	0.391	N(9)

Notes:

(1) NB-3600 fatigue analysis revised to account for new RWCU out of service transient. Piping location with highest usage prior to reanalysis.

(2) Detailed 3-D NB-3200 reanalysis of RWCU-RCIC tee significantly reduced usage at what was the bounding piping location.

(3) NUREG/CR-6260 location. FW nozzle includes all material types. Detailed 3-D NB-3200 analysis performed of the nozzle and tee locations.

(4) Bounded by other piping locations.

(5) Piping location. NB-3600 analysis performed.

(6) N/C – Not calculated. Calculated for the refined analysis case.

(7) FW-04 location had higher usage prior to detailed 3-D reanalysis.

(8) Flued head to piping weld. 2-D NB-3200 analysis performed. Individual transients evaluated for fatigue contribution.

(9) Flued head body location. Transient cycles were lumped together and evaluated using the alternating stress for the most limiting transient, so the CUF is significantly more conservative than the other FW locations.

(10) $CUF_{en} > 1.0$. Further action required.

Table 2: CUF Values from LRA and CUF_{en} Values Using 60-year Cycle Projections – SLC System

			ASME Fatigue Curve		NUREG/CR-6909 Fatigue Curve and F_{en}		
System Component / Location	Location	Material	Node	CUF (60-year cycles)	CUF (60-year cycles)	CUF_{en} (60-year cycles)	Sentinel Location
Core ΔP Nozzle	Outside surface(1)	Inconel	N/A	0.637	0.580	1.478(4)	Y(1)
Piping	Piping inside containment	SS	55	0.097(2)	0.108	0.503	N(2)
Piping	Piping outside containment	SS	95	0.056	N/C(3)	N/C(3)	N(3)
Penetration X-42	Weld	SS	N/A	0.002	N/C(3)	N/C(3)	N(3)
	Body	SS	N/A	0.001			

Notes:
(1) Bounding CUF location in SLC system. Analyzed using more rigorous design by analysis (NB-3200) methods.
(2) Analysis used design by rule (NB-3600) approach. Use of 1977 Code with 1979 Addenda reduced usage from the original design analysis.
(3) N/C – Not calculated. Bounded by Node 55.
(4) $CUF_{en} > 1.0$. Further action required.

3) The site-specific application of the screening process for identifying EAF limiting locations comprised the following activities:
   - Fermi 2-specific fatigue analyses were performed for Class 1 reactor coolant pressure boundary locations with reported CUF values using the design fatigue curves from NUREG/CR-6909, Revision 0.
     - Locations not wetted (not in contact with reactor water) were screened out (e.g. HPCI steam line).
     - Components with the highest design CUF were evaluated for the effects of EAF.
     - For each system evaluated, EAF was calculated for each material type present (e.g. carbon steel, low alloy steel, stainless steel, Ni-Cr-Fe alloy / Inconel).
   - To calculate F_{en} multipliers, the following assumptions were used:
     - Fermi 2-specific historical dissolved oxygen values for each reactor water chemistry zone were used.
     - Strain rate values that maximize EAF in the NUREG/CR-6909 equations for EAF were used.
     - Sulfur values that maximize EAF in the NUREG/CR-6909 equations for EAF were used (applies only to carbon and low alloy steels).

   F_{en} multipliers were developed for various temperatures for carbon steel, low alloy steel, stainless steel and Ni-Cr-Fe alloy for each of six listed reactor water chemistry zones. F_{en} multipliers also considered dissolved oxygen (DO) levels associated with the plant water chemistry history and accounted for the Normal Water Chemistry (NWC), Hydrogen Water Chemistry (HWC) and On-line Noble Metal Chemistry (OLNC) availability. CUF_{en} calculations were initially made using these zone-specific F_{en} values at the maximum design transient temperature of 575°F.

   Thus, CUF_{en} values were initially calculated assuming the least favorable conditions for metal sulfur content, component strain rate and temperature along with the zone-specific DO values.

   The plant fluid systems were subdivided into subsystems in a manner consistent with the fatigue analyses comprising the current design basis and the screening process compared all components in the same fluid subsystem. Thus, this screening approach inherently addressed all thermal zones.

   The following systems and locations identified in NUREG/CR-6260 were addressed. All these locations are Sentinel locations.
   - Feedwater
     - Nozzle (all materials)
     - FW piping where RCIC/RWCU are connected (more severe than where HPCI is connected)
   - Core spray
     - Nozzle (all materials)

    - Piping
- Reactor Recirculation
    - Inlet nozzle (all materials)
    - Outlet nozzle (all materials)
- RHR
    - Supply piping
    - Return piping
- Reactor Vessel shell and lower head
    - RPV shell
    - CRD nozzle

For completeness, in addition to the NUREG/CR-6260 locations, the RWCU piping, Reactor Recirculation piping and SLC nozzle and piping were evaluated.

Additional Sentinel locations were selected by the following process. For each fluid system:

1. Select the location with the largest CUF_{en} value for each material present.
2. Eliminate locations with CUF_{en} values less than a value of 0.8 (unless the location is part of a component with other materials present some of whose CUF_{en} values exceed 0.8).
3. Retain the remaining locations with the second largest CUF_{en} of a given material if it is within 50% of the value of the largest location in that fluid system. Eliminate any remaining locations.

Engineering judgment was used to address dynamic and rapid cycling loads. NUREG/CR-6909 states in Section 4.2 that existing fatigue data indicates that a slow strain rate applied during a tensile-loading cycle is primarily responsible for environmentally assisted reduction in fatigue life and also states that when all threshold conditions are satisfied, the fatigue life of carbon and low-alloy steels decreases logarithmically with decreasing strain rate below 1%/s. Accordingly, transient pairs which had solely dynamic or rapid cycling loading values had no environmental fatigue multipliers applied (F_{en} = 1.0).

Subsequent to this establishment of Sentinel locations, additional refined analysis was performed for those Sentinel locations with CUF_{en} values exceeding a value of 1.0 with the intention of achieving CUF_{en} values of 1.0 or less. Where this occurred, these locations were re-evaluated with reduced F_{en} multipliers using average transient temperatures (based on NUREG/CR-6909 guidance) or where load pairs subject to dynamic loading for the load pair in question (e.g., OBE) were directly available in the listed inputs.

Sentinel locations with a calculated projected CUF_{en} greater than 1.0 as a result of the screening activity were identified as requiring additional action prior to actually exceeding this value.

LRA Revisions:

None.

Enclosure 2 to
NRC-15-0067

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

DTE Revised Response to NRC Request for Additional Information for the Review of the Fermi 2 License Renewal Application – Set 25 Question B.1.16-2a

Set 25 RAI B.1.16-2a

Background

The response to request for additional information (RAI) B.1.16-2, dated January 28, 2015, states that the External Surfaces Monitoring Program will be revised to inspect insulated components to ensure that moisture intrusion has not degraded the insulation when the insulation is required to reduce heat transfer. Commitment No. 11h and Enhancement No. 8 were added to revise the program procedures to include instructions for the inspection of both jacketed and non-jacketed insulation for insulation degradation due to moisture intrusion.

Generic Aging Lessons Learned (GALL) Report Aging Management Program (AMP) XI.M36, as revised by License Renewal Interim Staff Guidance (LR-ISG)-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation," provides guidance on the inspection of jacketed insulation to manage reduced heat transfer. The "detection of aging effects" program element states that if configuration features, such as minimum overlap and seam locations, associated with jacketed insulation are not applicable that an alternative inspection methodology should be proposed to address reduced thermal insulation resistance.

Issue

The staff lacks the information necessary to evaluate the aging management of reduced thermal insulation resistance of non-jacketed insulation. The External Surfaces Monitoring Program does not include an inspection methodology or frequency to detect reduced thermal insulation resistance due to moisture intrusion for non-jacketed insulation.

Request

Provide the inspection methodology and frequency used to manage reduced thermal insulation resistance for non-jacketed insulation. State the basis for the inspection methodology and frequency.

Response:

DTE previously responded to RAI B.1.16-2a by letter dated April 17, 2015 (NRC-15-0032). The response to RAI B.1.16-2a is revised to include additional information requested by the NRC on clarification calls held on May 14 and 28, 2015. The revised response below supersedes the response previously provided on April 17, 2015.

Visual inspection of jacketed and non-jacketed insulation that performs an intended function of "insulation" will be conducted in accordance with the External Surfaces Monitoring Program. Visual inspection of this insulation will occur at a frequency consistent with NUREG-1801 Section XI.M36, as modified by LR-ISG-2012-02. Potential water intrusion will be considered.

Signs of water intrusion would include discoloration, staining, or surface irregularities. It is expected that insulation that shows no sign of discoloration, stains, or surface irregularities would perform its intended insulation function. Enhancements in the External Surfaces Monitoring Program (LRA Sections A.1.16 and B.1.16) will be revised to include a description of these activities.

In addition, non-jacketed thermal insulation with the intended function of "insulation" will be monitored through the Periodic Surveillance and Preventive Maintenance (PSPM) Program. In each five-year period beginning five years prior to the period of extended operation (PEO) where plant conditions permit (i.e., the insulated pipe is carrying a heat load and is not located in a high radiation area), thermography of at least 20 percent of the available population will be performed to assess its insulating ability. A revision to the PSPM Program (LRA Sections A.1.35 and B.1.35) will be made to include a description of these activities.

LRA Revisions:

LRA Table 3.5.2-4 and LRA Sections A.1.16, A.1.35, A.4, B.1.16, and B.1.35 are revised as shown on the following pages. Additions are shown in underline and deletions are shown in strike-through. Note that previous changes to these same LRA sections made in the July 30, 2014 letter (NRC-14-0051), January 15, 2015 letter (NRC-15-0002), and January 28, 2015 letter (NRC-15-0007) are not shown in underline or strike-through such that only the new changes due to RAI B.1.16-2a are shown as revisions.

Table 3.5.2-4
Bulk Commodities
Summary of Aging Management Evaluation

Table 3.5.2-4: Bulk Commodities								
Structure and/or Component or Commodity	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Insulation (includes jacketing, wire mesh, tie wires, straps, clips)	IN, SNS	Fiberglass, calcium silicate, Fiberfrax, fiberfrax ceramic fiber durablanket, Insulfrax	Air – indoor uncontrolled	Loss of material, Change in material properties, Degradation due to moisture intrusion	External Surfaces Monitoring Periodic Surveillance and Preventive Maintenance			J

A.1.16 External Surfaces Monitoring Program

Acceptance criteria are defined to ensure that the need for corrective action is identified before a loss of intended function. For stainless steel, a clean shiny surface is expected. For flexible polymers, a uniform surface texture (no cracks) and no change in material properties (e.g., hardness, flexibility, physical dimensions, color unchanged from when the material was new) are expected. For rigid polymers, no surface changes affecting performance, such as erosion, cracking, crazing, checking, and chalking, are acceptable. For insulation, no discoloration, staining, or surface irregularities from moisture intrusion is expected.

The External Surfaces Monitoring Program will be enhanced as follows.

- Revise External Surfaces Monitoring Program procedures to include acceptance criteria for the parameters observed.
  - Metals should not have any indications of relevant degradation.
  - Flexible polymers should have a uniform surface texture and color with no cracks and no dimension change, no abnormal surface conditions with respect to hardness, flexibility, physical dimensions, and color.
  - Rigid polymers should have no erosion, cracking, crazing, or chalking.
  - For insulation, no discoloration, staining, or surface irregularities from moisture intrusion.
- Revise External Surfaces Monitoring Program procedures to stipulate that administrative controls are in accordance with the Fermi 2 10 CFR 50 Appendix B Quality Assurance Program.
- Revise External Surfaces Monitoring Program procedures to include instructions for detection of cracking of gas-filled stainless steel and aluminum components exposed to outdoor air.
- ~~Revise External Surfaces Monitoring Program procedures to include instructions for monitoring of insulation required to reduce heat transfer to ensure insulation degradation due to moisture intrusion has not occurred. These instructions will include inspection guidance for both jacketed and non-jacketed insulation.~~
  Revise External Surfaces Monitoring Program procedures to: a) Visually inspect jacketed and non-jacketed insulation required to reduce heat transfer at a frequency consistent with NUREG-1801 Section XI.M36, as modified by LR-ISG-2012-02, to ensure that insulation degradation due to moisture intrusion has not occurred. b) Ensure procedures include instructions to inspect for signs of water intrusion. Inspect accessible surfaces for the following signs of water intrusion: discoloration, staining, or surface irregularities.

Enhancements will be implemented prior to the period of extended operation.

A.1.35 Periodic Surveillance and Preventive Maintenance Program

The Fermi 2 aging management review credits the following inspection activities.

- Visually inspect and manually flex the rubber gasket/seal for reactor building spent fuel storage pool gates to verify no loss of sealing.
- Determine wall thickness of selected service water system piping components to manage loss of material due to recurring internal corrosion by multiple corrosion mechanisms.
- Visually inspect a representative sample of emergency diesel generator (EDG) system air coolant, lube oil, and jacket water heat exchanger tubes to manage loss of material due to wear.
- Determine wall thickness of selected EDG system piping components to manage loss of material due to recurring internal corrosion by multiple corrosion mechanisms.
- Use visual or other NDE techniques to inspect internal surfaces to manage fouling of the fire water system heat exchanger tubes exposed to raw water.
- Visually inspect a representative sample of the dry piping downstream of the manual isolation valve for the cable spreading room wet pipe system for flow blockage. The first inspection will be within five years of the period of extended operation.
- Visually inspect a representative sample of combustion turbine generator (CTG) system lube oil heat exchanger tubes to manage loss of material due to wear.
- Visually inspect a representative sample of CTG system atomizing air precooler heat exchanger tubes to manage fouling and loss of material due to wear.
- Visually inspect and clean CTG system atomizing air booster compressor suction filter to manage fouling.
- Visually inspect and clean CTG system compressor extraction air filter to manage fouling.
- Use visual or other NDE techniques to inspect containment atmospheric control system recombiner components' internal surfaces to manage loss of material.
- Perform thermography on a sample of non-jacketed insulation having an intended function of "insulation" to assess its insulating ability. A sample will consist of at least 20 percent of the available population of non-jacketed insulation where the insulated piping has a heat load and is not located in a high radiation area. The first thermography will be during the five years prior to the period of extended operation.

A.4 LICENSE RENEWAL COMMITMENT LIST

No.	Program or Activity	Commitment	Implementation Schedule	Source
11	External Surfaces Monitoring	Enhance External Surfaces Monitoring Program as follows: e. Revise External Surfaces Monitoring Program procedures to include acceptance criteria for the parameters observed. • Metals should not have any indications of relevant degradation. • Flexible polymers should have a uniform surface texture and color with no cracks and no dimension change, no abnormal surface conditions with respect to hardness, flexibility, physical dimensions, and color. • Rigid polymers should have no erosion, cracking, crazing, or chalking. • For insulation, no discoloration, staining, or surface irregularities from moisture intrusion.	Prior to September 20, 2024.	A.1.16

No.	Program or Activity	Commitment	Implementation Schedule	Source
		h. ~~Revise External Surfaces Monitoring Program procedures to include instructions for monitoring of insulation required to reduce heat transfer to ensure insulation degradation due to moisture intrusion has not occurred. These instructions will include inspection guidance for both jacketed and non-jacketed insulation.~~ Revise External Surfaces Monitoring Program procedures to: a) Visually inspect jacketed and non-jacketed insulation required to reduce heat transfer at a frequency consistent with NUREG-1801 Section XI.M36, as modified by LR-ISG-2012-02, to ensure that insulation degradation due to moisture intrusion has not occurred. b) Ensure procedures include instructions to inspect for signs of water intrusion. Inspect accessible surfaces for the following signs of water intrusion: discoloration, staining, or surface irregularities.		

B.1.16 EXTERNAL SURFACES MONITORING

Program Description

For polymeric materials, the visual inspection will include 100 percent of the accessible components. The sample size of polymeric components that receive physical manipulation is at least ten percent of the available surface area.

Examples of inspection parameters for (jacketed and non-jacketed) insulation include the following:

- Discoloration
- Staining
- Surface irregularities

Acceptance criteria are defined to ensure that the need for corrective action is identified before a loss of intended function. For stainless steel, a clean shiny surface is expected. For flexible polymers, a uniform surface texture (no cracks) and no change in material properties (e.g., hardness, flexibility, physical dimensions, color changed from when the material was new) are expected. For rigid polymers, no surface changes affecting performance such as erosion, cracking, crazing, checking, and chalking, are acceptable. For insulation, no discoloration, staining, or surface irregularities from moisture intrusion is expected.

Enhancements

Element Affected	Enhancement
3. Parameters Monitored or Inspected 4. Detection of Aging Effects	~~Revise External Surfaces Monitoring Program procedures to include instructions for monitoring of insulation required to reduce heat transfer to ensure insulation degradation due to moisture intrusion has not occurred. These instructions will include inspection guidance for both jacketed and non-jacketed insulation.~~ Revise External Surfaces Monitoring Program procedures to: a) Visually inspect jacketed and non-jacketed insulation required to reduce heat transfer at a frequency consistent with NUREG-1801 Section XI.M36, as modified by LR-ISG-2012-02, to ensure that insulation degradation due to moisture intrusion has not occurred. b) Ensure procedures include instructions to inspect for signs of water intrusion. Inspect accessible surfaces for the following signs of water intrusion: discoloration, staining, or surface irregularities.

Element Affected	Enhancement
6. Acceptance Criteria	Revise External Surfaces Monitoring Program procedures to include acceptance criteria for the parameters observed. • Metals should not have any indications of relevant degradation. • Flexible polymers should have a uniform surface texture and color with no cracks and no dimension change, no abnormal surface conditions with respect to hardness, flexibility, physical dimensions, and color. • Rigid polymers should have no erosion, cracking, crazing, or chalking. • For insulation, no discoloration, staining, or surface irregularities from moisture intrusion.

B.1.35 PERIODIC SURVEILLANCE AND PREVENTIVE MAINTENANCE

The Fermi 2 aging management review credits the following inspection activities.

Reactor building	Visually inspect and manually flex the rubber gasket/seal for spent fuel storage pool gates to verify no loss of sealing.
Service water system	Determine wall thickness of selected service water system piping components to manage loss of material due to recurring internal corrosion by multiple corrosion mechanisms.
Emergency diesel generator (EDG) system	Visually inspect a representative sample of EDG system air coolant, lube oil, and jacket water heat exchanger tubes to manage loss of material due to wear. Determine wall thickness of selected EDG system piping components to manage loss of material due to recurring internal corrosion by multiple corrosion mechanisms.
Fire water system	Use visual or other NDE techniques to inspect internal surfaces to manage fouling of the fire water system heat exchanger tubes exposed to raw water. Visually inspect a representative sample of the dry piping downstream of the manual isolation valve for the cable spreading room wet pipe system for flow blockage. The first inspection will be within five years of the period of extended operation.
Combustion turbine generator (CTG) system	Visually inspect a representative sample of CTG system lube oil heat exchanger tubes to manage loss of material due to wear. Visually inspect a representative sample of CTG system atomizing air precooler heat exchanger tubes to manage fouling and loss of material due to wear. Visually inspect and clean CTG system atomizing air booster compressor suction filter to manage fouling. Visually inspect and clean CTG system compressor extraction air filter to manage fouling.
Containment atmospheric control system	Use visual or other NDE techniques to inspect containment atmospheric control system recombiner components' internal surfaces to manage loss of material.
Non-jacketed insulation	Perform thermography on a sample of non-jacketed insulation having an intended function of "insulation" to assess its insulating ability. A sample will consist of at least 20 percent of the available population of non-jacketed insulation where the insulated piping has a heat load and is not located in a high radiation area. The first thermography will be during the five years prior to the period of extended operation.