



November 10, 2016

ULNRC-06330

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

10 CFR 50.71(e)
10 CFR 54.37(b)
10 CFR 50.4(b)(6)

Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
RENEWED FACILITY OPERATING LICENSE NPF-30
FINAL SAFETY ANALYSIS REPORT REVISION OL-22
AND TECHNICAL SPECIFICATION BASES REVISION 13**

In accordance with the requirements of 10 CFR 50.71(e) and 10 CFR 50.4(b)(6), Union Electric Company (Ameren Missouri) herewith submits the Callaway Plant Final Safety Analysis Report (FSAR) (Standard Plant and Site Addendum) updated through Revision OL-22. The FSAR has been revised to include changes made to the plant up to 6 months prior to the date of this filing. Additionally, pursuant to Callaway Technical Specification 5.5.14, "Technical Specifications (TS) Bases Control Program," Ameren Missouri is also submitting Revision 13 to the Callaway Plant Technical Specification Bases (TS Bases) since the TS Bases update is required to be submitted at a frequency consistent with 10 CFR 50.71(e). The TS Bases have been revised to reflect changes made to the plant up to 6 months prior to the date of this filing.

Based on NRC Regulatory Issue Summary (RIS) 2015-17, "Review and Submission of Updates to Final Safety Analysis Reports, Emergency Preparedness Documents, and Fire Protection Documents," Ameren Missouri has reviewed Revision OL-22 of the FSAR for sensitive information. Consequently, Revision OL-22 of the FSAR is being provided on two CD-ROMs (CDs). One version, on CD 1 (provided as Enclosure 2), is a complete text of the FSAR and contains sensitive information which should be withheld from public disclosure per the guidance in RIS 2015-17. The information that Ameren Missouri has identified to be withheld is designated by the statement "Withhold per RIS 2015-17" at the top and bottom of the page. The second version, on CD 2 (provided as Enclosure 3), is a redacted text of the FSAR. Each page on which information was withheld contains the

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designation "Withheld per RIS 2015-17." The version on CD 2 is therefore suitable for public disclosure.

The documents on both CDs are being transmitted in electronic format in accordance with the guidance of Regulatory Issue Summary (RIS) 2001-05, dated January 25, 2001.

In addition to the updated FSAR and TS Bases, the enclosed CD-ROMs include the Callaway Plant Operating License, Technical Specifications, and NRC Orders for Callaway Plant updated through November 10, 2016. Also included is an "FSAR Change Log" file that provides information on the FSAR Change Notices that were incorporated into FSAR Revision OL-22.

All of the provided documents are in the PDF Normal format and can be viewed using Adobe Acrobat Reader. A copy of Adobe Acrobat Reader 5.0 with the Search plug-in is included on the CD-ROMs. Also included is an "eLDL Readme" file that provides a brief description of the format and some basic guidance for using the electronic licensing document library.

This submittal contains PDF files that contain hyperlinks to other files contained on the CD-ROM. These hyperlinks are not essential to the use of the filing. Any material referenced by a hyperlink to another PDF that was essential for the use of this filing has either been included by reference or submitted as part of this filing. In addition, it should be noted that the document file naming convention was created prior to the NRC requirement to use the ISO 9660 naming convention, and due to the interactive linking within the documents, these documents cannot be readily converted to the ISO 9660 naming convention.

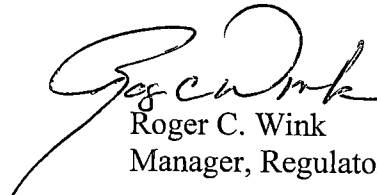
In addition to the documents described above, Enclosure 1 contains a report describing how the effects of aging of newly-identified structures, systems, or components (SSCs) will be managed, as required by 10 CFR 54.37(b).

This letter contains no new commitments. Please contact Tom Elwood, Supervising Engineer, Regulatory Affairs and Licensing, at (314) 225-1905 for any questions you may have regarding this submittal.

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

Sincerely,

Executed on: November 10, 2016

 PIN6381
Roger C. Wink
Manager, Regulatory Affairs

TAW/sls

Enclosure 1 - Summary of Newly Identified SSCs Within the Scope of the Aging Management Program

Enclosure 2 - CD 1

Enclosure 3 - CD 2

ULNRC-06330
November 10, 2016
Page 4

cc: Mr. Kriss M. Kennedy
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. L. John Klos
Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O8H4
Washington, DC 20555-0001

Caitlin Murphy
Institute of Nuclear Power Operations
700 Galleria Parkway SE, Suite 100
Atlanta, GA 30339

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Hardcopy:

Certrec Corporation
6100 Western Place, Suite 1050
Fort Worth, TX 76107
(Certrec receives ALL attachments as long as they are non-safeguards and may be publicly disclosed.)

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F. M. Diya
T. E. Herrmann
S. P. Banker
R. C. Wink
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Mr. Greg Voss; REP Manager (SEMA)
STARS Regulatory Affairs
Mr. Jay Silberg (Pillsbury Winthrop Shaw Pittman LLP)
Missouri Public Service Commission
Ms. Leanne Tippet-Mosby (DNR)

Enclosure 1 to ULNRC-06330

**Summary of Newly Identified Structures, Systems, and
Components (SSCs) Within the Scope of the Aging
Management Program**

REPORT CONSISTENT WITH 10 CFR 54.37(b) ON HOW EFFECTS OF AGING OF NEWLY-IDENTIFIED STRUCTURES, SYSTEMS, OR COMPONENTS ARE MANAGED

This update follows existing regulatory requirements and guidance regarding the appropriate level of detail for reports under 10 CFR 54.37(b), including details presented in "Frequently Asked Questions (FAQs) About License Renewal" of Inspection Procedure (IP) 71003, "Post-Approval Site Inspection for License Renewal." This report provides summary information and technical details as required by 10 CFR 54.37(b) for the period between July 31, 2014 through June 23, 2016.

Regulatory Requirements and Guidance

10 CFR 54.37(b)

After the renewed license is issued, the FSAR update required by 10 CFR 50.71(e) must include any systems, structures, and components newly identified that would have been subject to an aging management review or evaluation of time-limited aging analyses in accordance with Section 54.21. This FSAR update must describe how the effects of aging will be managed such that the intended function(s) in section 54.4(b) will be effectively maintained during the period of extended operation.

RIS 2007-16, Revision 1

Newly Identified Systems, Structures, and Components

The intent of 10 CFR 54.37(b) is to capture those SSCs that, if they had been identified at the time of the license renewal application, would have been subject to an aging management review or evaluation of TLAs. In the context of 10 CFR 54.37(b), newly identified SSCs that should be included in the next FSAR update required by 10 CFR 50.71(e) are those SSCs that meet one of the two following conditions:

- (1) There is a change to the current licensing basis (CLB) that meets the following criteria:
 - The change impacts SSCs that were not in scope for license renewal when the NRC approved the license renewal application.*
 - The SSCs would have been in the scope of license renewal based on the CLB change if 10 CFR 54.4(a) were applied to the SSCs.**
- (2) SSCs were installed in the plant at the time of the license renewal review that, in accordance with the CLB at the time, should have been included in the scope of license renewal per 10 CFR 54.4(a) but were not identified as in scope until after issuance of the renewed license.*

SSCs that are plant additions or modifications installed after the renewed license is issued are not subject to the provisions of 10 CFR 54.37(b).

Identification of SSCs under 10 CFR 54.37(b)

The language of 10 CFR 54.37(b) does not limit how or who finds newly identified SSCs. A licensee may identify SSCs that should be within the scope of its license renewal program at any time. The NRC staff may also discover newly identified SSCs. One way to identify these SSCs is through the LR-ISG process.

Summary of Newly Identified Systems, Structures, or Components (SSCs)

Alternate Emergency Power System

Ameren Missouri installed an Alternate Emergency Power System (AEPS) which provides power to the non-safety auxiliary feedwater pump, which is credited in the NFPA 805 fire protection analysis; therefore, it performs a fire protection function for License Renewal (LR).

The AEPS consists of four skid-mounted diesel generators which include cooling systems, exhaust piping, mufflers and rain caps, fuel lines and fuel tanks, metal sided structures, and concrete foundations. Support equipment includes an electric transformer and switchgear, including metal sided structures, concrete foundations, above and underground power cables, and electrical connections. The following AMPs are credited for managing the aging of the AEPS during the Period of Extended Operation (PEO):

Bolting Integrity (FSAR SP 19.1.8)

External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)

Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (FSAR SP 19.1.23)

Fuel Oil Chemistry (FSAR SP 19.1.16)

The following exception is taken for inspection of the AEPS fuel oil storage tanks:

NUREG-1801 Rev 2 XI.M30, Fuel Oil Chemistry, requires that at least once during the 10-year period prior to the period of extended operation and every 10 years during the period of extended operation, each diesel fuel tank is drained and cleaned, the internal surfaces are visually inspected (if physically possible) and volumetrically-inspected if evidence of degradation is observed during visual inspection, or if visual inspection is not possible. The Callaway AEPS fuel oil storage tanks cannot be physically cleaned and inspected due to design constraints associated with a secondary containment tank that limits access. The presence of fuel oil in the secondary containment of these fuel oil storage tanks provides a local alarm which would indicate a leak in the primary tank. Equipment operators monitor the alarm panel as part of daily rounds. The local

alarm provides a method of alerting plant staff to aging effects on the tank prior to the degradation challenging the tank's ability to maintain the intended function of the AEPS during the period of extended operation.

Lubricating Oil Analysis (FSAR SP 19.1.24)

One-Time Inspection (FSAR SP 19.1.18)

Closed Treated Water Systems (FSAR SP 19.1.11)

Selective Leaching (FSAR SP 19.1.19)

Structures Monitoring (FSAR SP 19.1.31)

Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (FSAR SP 19.1.34)

Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (FSAR SP 19.1.36)

Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (FSAR SP 19.1.37)

Table 1 in Attachment 1 to this enclosure identifies the components and structures requiring aging management and provides how the effects of aging are managed so that the intended functions are effectively maintained during the period of extended operation. The use of the aging management programs credited in Table 1 are consistent with NUREG-1801 Rev 2, Generic Aging Lessons Learned (GALL) Report," and those approved in the Callaway Safety Evaluation Report, NUREG-2172 with one exception of Fuel Oil Chemistry described above.

Doors Credited as Fire Barriers

Two (2) newly identified doors are fire barriers which are credited in the NFPA 805 fire protection analysis. The following AMPs are credited for managing the aging of these doors during the PEO:

Structures Monitoring (FSAR SP 19.1.31)

Fire Protection (FSAR SP 19.1.13)

Table 2 in Attachment 1 of this enclosure identifies how the effects of aging are managed for the subject fire barrier doors so that the intended functions are effectively maintained during the period of extended operation. The use of the aging management programs credited in Table 2 is consistent with NUREG-1801 Rev 2 and is approved in the Callaway Safety Evaluation Report, NUREG-2172.

Newly Identified Time Limited Aging Analyses (TLAA)

Replacement Reactor Vessel Closure Head

The Replacement Reactor Vessel Closure Head (RRVCH) project design specification requires that the pressure retaining and integrally attached material shall meet all the requirements for ASME Class 1 vessels. The original Construction Code for Callaway closure head are ASME Section III, 1971 Edition, with Addenda through winter 1972 for the RRVCH and the Control Rod Drive Mechanism (CRDM) adapter and ASME Section III, 1974 Edition with Addenda through winter 1974 for the CRDM housings.

The design of ASME III Class 1 components requires fatigue analyses. These fatigue analyses are required to demonstrate that the Cumulative Usage Factor (CUF) for the component will not exceed the Code design limit of 1.0 when the component is exposed to all of the postulated transients.

The RRVCH assembly design specification states that the cumulative operating period shall cover 45 calendar years. The fatigue analyses depend on the numbers of anticipated transients over the life of the plant. The numbers of design transients used in the fatigue analyses are consistent with the original design basis listed in FSAR SP Table 3.9(N)-1 SP and monitored by the Fatigue Monitoring program (FSAR SP 19.2.1).

The Class 1 fatigue analyses of the RRVCH, CRDMs, and Core Exit Thermal Nozzle Assemblies (CETNA) components used the design basis numbers of events. The RRVCH, CRDMs, and CETNAs were replaced in Refueling Outage 20 (Fall 2014). These fatigue analyses are based on a 45-year design life, which ends in 2059. This extends beyond the period of extended operation; therefore, these fatigue analyses are new TLAAAs. The design is valid through the period of extended operation and the TLAAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i). FSAR SP Section 19.3.2.1.5 is added to identify the TLAAAs associated with the design of the RRVCH, CRDM, and CETNA.

In addition to the new TLAAAs associated with the design of the RRVCH, CRDM, and CETNA, the RRVCH modification removed the TLAA associated CRDM canopy weld crack growth from the design basis.

HDPE Break Exception

Callaway revised FSAR SP Section 3.6.2.1.2.4 and FSAR SP Table 3.6-2 to add a low stress exclusion criterion for high-density polyethylene (HDPE) piping.

The break exception criterion described in FSAR SP Section 3.6.2.1.2.4 and FSAR SP Table 3.6-2, which requires the sum of Service Level B Longitudinal Stress Equation and Alternate Thermal Expansion or Contraction Evaluation to be less than 0.4 ($1.2S + 1100$), assumes an allowable stress that is based on 50 years. The replacement of buried Essential Service Water (ESW) piping with HDPE material began in 2008. This

extends the exception beyond the period of extended operation therefore, the TLAA will remain valid for the period of extended operation, and is dispositioned in accordance with 10 CFR 54.21(c)(1)(i). FSAR SP Section 19.3.6.11 is added to identify the TLAA associated with the Break Exception for HDPE Piping.

Attachment 1

The following tables contain the newly identified components and structures requiring aging management and provide how the effects of aging are managed so that the intended functions are effectively maintained during the period of extended operation.

Table 1

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of Preload	Bolting Integrity (FSAR SP 19.1.8)
				Loss of Material	
Damper	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)
			Ventilation Atmosphere (Int)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (FSAR SP 19.1.23)
Filter	PB	Aluminum	Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)
			Plant Indoor Air (Ext)		None
Filter	PB	Carbon Steel	Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)
			Plant Indoor Air (Ext)		Loss of Material
					External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)

Alternate Emergency Power System Aging Management Review						
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program	
Flexible Hoses	PB	Elastomer	Closed Cycle Cooling Water (Int)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (FSAR SP 19.1.23)	
			Fuel Oil (Int)	Hardening and Loss of Strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (FSAR SP 19.1.23)	
			Plant Indoor Air (Ext)	Hardening and Loss of Strength	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)	
				Loss of Material		
Heat Exchanger (AEPS LO Cooler)	PB	Carbon Steel	Lubricating Oil (Int)	Loss of Material	Lubricating Oil Analysis (FSAR SP 19.1.24)	
					One-Time Inspection (FSAR SP 19.1.18)	
			Plant Indoor Air (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)	
	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of Heat Transfer	Loss of Material	Closed Treated Water Systems (FSAR SP 19.1.11)
			Lubricating Oil (Ext)	Loss of Material	Lubricating Oil Analysis (FSAR SP 19.1.24)	
				One-Time Inspection (FSAR SP 19.1.18)		

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
Heat Exchanger (AEPS Radiator)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of Heat Transfer	Closed Treated Water Systems (FSAR SP 19.1.11)
				Loss of Material	
			Plant Indoor Air (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)
Piping	PB	Aluminum	Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)
					One-Time Inspection (FSAR SP 19.1.18)
		Plant Indoor Air (Ext)	None	None	
		Carbon Steel	Atmosphere/ Weather (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)
			Plant Indoor Air (Ext)	Loss of Material	
			Condensation (Ext)	Loss of Material	
				Cracking	
Closed Cycle Cooling Water (Int)	Loss of Material	Closed Treated Water Systems (FSAR SP 19.1.11)			
Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)			

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
					One-Time Inspection (FSAR SP 19.1.18)
			Condensation (Int)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (FSAR SP 19.1.23)
			Diesel Exhaust (Int)	Loss of Material	
Pump	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of Material	Closed Treated Water Systems (FSAR SP 19.1.11)
			Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)
					One-Time Inspection (FSAR SP 19.1.18)
Plant Indoor Air (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)			
Sight Gauge	PB	Carbon Steel	Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)
					One-Time Inspection (FSAR SP 19.1.18)
			Plant Indoor Air (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
Tank	PB	Carbon Steel	Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16)
					One-Time Inspection (FSAR SP 19.1.18)
			Plant Indoor Air (Ext)	Loss of Material	External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)
Valve	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of Material	Closed Treated Water Systems (FSAR SP 19.1.11)
			Plant Indoor Air (Ext)		External Surfaces Monitoring of Mechanical Components (FSAR SP 19.1.21)
		Copper Alloy (>15% Zinc)	Closed Cycle Cooling Water (Int)	Loss of material	Selective Leaching (FSAR SP 19.1.19)
					Closed Treated Water Systems (FSAR SP 19.1.11)

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
			Fuel Oil (Int)	Loss of Material	Fuel Oil Chemistry (FSAR SP 19.1.16) One-Time Inspection (FSAR SP 19.1.18)
			Lubricating Oil (Int)	Loss of Material	Lubricating Oil Analysis (FSAR SP 19.1.24) One-Time Inspection (FSAR SP 19.1.18)
			Plant Indoor Air (Ext)	None	None
Bolting (Structural)	SS	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	Structures Monitoring (FSAR SP 19.1.31)
Concrete Elements	SH, SS	Concrete	Atmosphere/ Weather (Ext)	Loss of material (spalling, scaling)	Structures Monitoring (FSAR SP 19.1.31)
				Increase in porosity and permeability; loss of strength	
				Cracking	

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
				Increase in porosity and permeability; cracking; loss of material (spalling, scaling)	Structures Monitoring (FSAR SP 19.1.31)
			Buried (Ext)	Increase in porosity and permeability; cracking; loss of material (spalling, scaling)	
				Cracking and distortion Cracking; loss of bond; and loss of material (spalling, scaling)	
Door	SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext) Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring (FSAR SP 19.1.31)
Metal Siding	SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext) Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring (FSAR SP 19.1.31)

Alternate Emergency Power System Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal /-External	Aging Effect Requiring Management	Aging Management Program
Structural Steel	SH, SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring (FSAR SP 19.1.31)
			Concrete (Structural) (Ext)	None	None
			Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring (FSAR SP 19.1.31)
Cable Connections (Metallic Parts)	EC	Various Metals Used for Electrical Contacts	Plant Indoor Air (Ext)	Increased resistance of connection	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (FSAR SP 19.1.37)
Insulated Cable and Connections	IN	Various Organic Polymers	Adverse Localized Environment (Ext)	Reduced insulation resistance	Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (FSAR SP 19.1.34)
					Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (FSAR SP 19.1.36)

Table 2

Fire Barrier Door Aging Management Review					
Component Type	Intended Function ⁽¹⁾	Material	Environments Internal / External	Aging Effect Requiring Management	Aging Management Program
Fire Barrier Door	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring (FSAR SP 19.1.31)
					Fire Protection (FSAR SP 19.1.13)

(1) Intended Function Acronyms:

- EC Electrical Continuity Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals.
- FB Fire Barrier Provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
- HT Heat Transfer Provide heat transfer.
- IN Insulate (electrical) Insulate and support an electrical conductor.
- PB Pressure Boundary Provide pressure-retaining boundary so that sufficient flow at adequate pressure is delivered, or provide fission product barrier for containment pressure boundary, or provide containment isolation for fission product retention.
- SH Shelter, Protection Provide shelter/protection to safety-related components
- SS Structural Support Provide structural and / or functional support to safety-related and/or nonsafety-related components

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Enclosure 2 to ULNRC-06330

**CD 1
Complete FSAR Text
Contains Sensitive Information**

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Enclosure 3 to ULNRC-06330

**CD 2
Redacted FSAR Text**

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