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OPPD
Omaha Public Power District

444 South 16th Street Mall
Omaha NE 68102-2247

January 9, 2002
LIC-02-0001

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

References: 1. Docket No. 50-285
2. Letter from OPPD (W.G. Gates) to NRC (Document Control Desk) dated January 9, 2002 (LIC-02-0005)

SUBJECT: Fort Calhoun Station Unit 1
Application for Renewed Operating License

Pursuant to applicable requirements of 10 CFR Parts 50, 51, and 54, Omaha Public Power District (OPPD) hereby applies for the renewal of the operating license for Fort Calhoun Station Unit 1. The current license (DPR-40) expires on midnight of August 9, 2013. OPPD requests that the operating term of this license be extended by 20 years, so that the license will expire on midnight of August 9, 2033.

The enclosed Fort Calhoun Station Unit 1 License Renewal Application (LRA) contains information required by 10 CFR Part 54, and is filed in accordance with Subpart A of 10 CFR Part 2, 10 CFR 50.4, and 10 CFR 50.30. Appendix E of the LRA is an environmental report which satisfies the applicable requirements of Subpart A of 10 CFR Part 51.

The enclosed LRA has been prepared in a format compatible with NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants,* published July 2001. The LRA contains references to NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, published July 2001.

The technical information relating to plant design contained in the LRA is complete and accurate as of June 30, 2001. The attachment to this letter is a summary of OPPD commitments contained in the LRA. Current licensing basis changes that have a material effect on the content of the LRA will be identified in amendments submitted at least annually while the LRA is under NRC review, as required by 10 CFR 54.21(b).

OPPD hereby submits the paper original and an electronic copy on compact disc of the LRA (with appendices) to the Document Control Desk. Persons as noted on the copy distribution list at the end of this letter will also each receive a paper copy. OPPD also is providing for NRC reviewers 81 compact discs containing electronic copies of the LRA (with appendices), the boundary drawings referenced in the LRA, and the Fort Calhoun Station Updated Safety Analysis Report (USAR), all in Adobe Portable Document Format (PDF) file format. The electronic boundary drawings and USAR are for information only and are not considered part of the LRA. To facilitate review, the compact disc copies include hyperlinks from the LRA text to referenced boundary drawings and USAR sections. Ten of the 81 compact discs for reviewers are being sent directly to Mr. Ken Zahn of Lawrence Livermore National Laboratory.

OPPD also is providing under separate cover letter (Reference 2) five paper sets of the license renewal boundary drawings referenced in the LRA to aid in NRC review; these drawings are not considered part of the LRA.

Please contact us if you have any questions.

I declare under penalty of perjury that the foregoing is true and correct. (Executed on January 9, 2002)

Sincerely,

W. G. Gates

W. G. Gates
Vice President

Attachment: Commitments Summary
Enclosure: License Renewal Application

c: E. W. Merschoff, NRC Regional Administrator, Region IV (w/o Attachment or Enclosure)
K. M. Kennedy, NRC Region IV, DRP Branch Chief
A. B. Wang, NRC Project Manager (w/o Attachment or Enclosure)
T. J. Kenyon, NRC License Renewal Project Manager
S. T. Hoffman, NRC License Renewal Project Manager
W. C. Walker, NRC Senior Resident Inspector
Division Administrator - Public Health Assurance, State of Nebraska
Winston & Strawn

SUMMARY OF COMMITMENTS CONTAINED IN THE FORT CALHOUN STATION UNIT 1 APPLICATION FOR RENEWED OPERATING LICENSE

(Note: Applicable Section/Appendix numbers are in parentheses.)

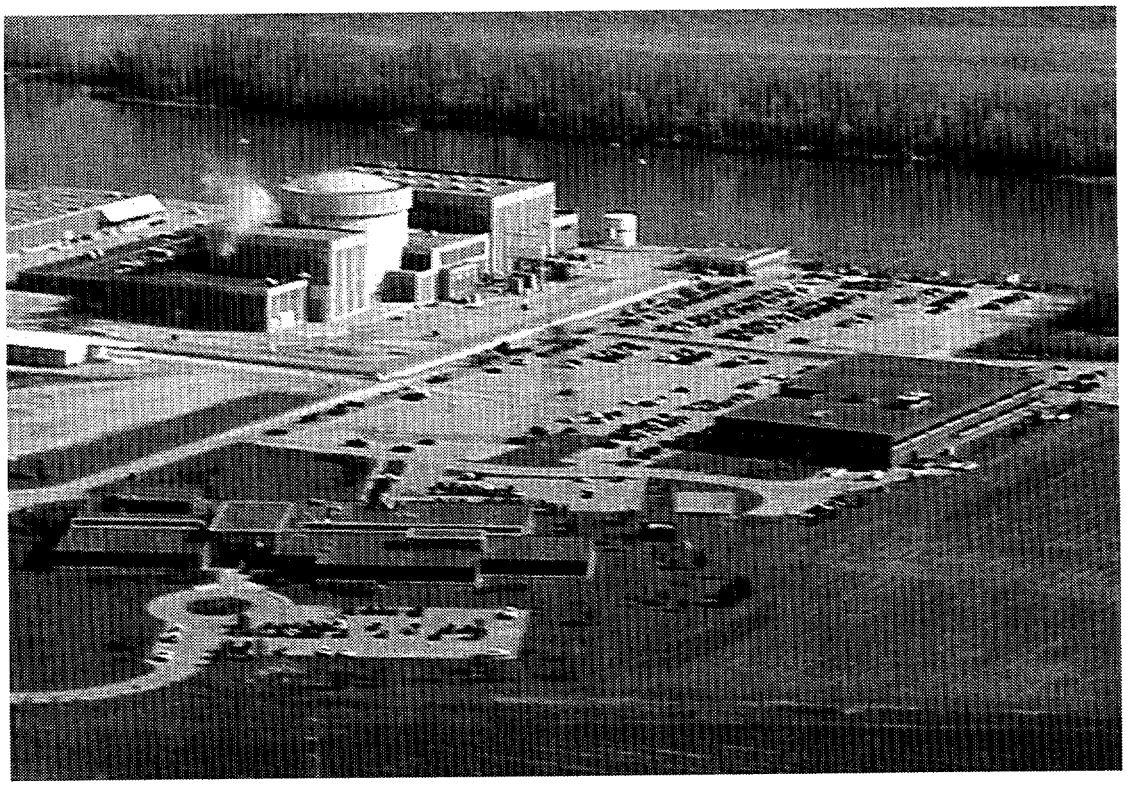
1. The Pressure/Temperature (P/T) curves analyses will be projected to the end of the period of extended operation. (4.2.1)
2. The Low Temperature Overpressure Protection (LTOP) PORV setpoints analyses will be projected to the end of the period of extended operation. (4.2.2)
3. The reactor vessel upper shelf energy analyses will be projected to the end of the period of extended operation. (4.2.4)
4. The containment liner plate and penetration sleeve fatigue analyses will be projected to the end of the period of extended operation. (4.6)
5. The Leak Before Break (LBB) Analysis for Resolution of USI A-2 will be projected to the end of the period of extended operation. (4.7.2)
6. The Chemistry Program will be enhanced (including conduct of a One-Time Inspection to confirm program effectiveness) prior to the period of extended operation. (3.3, B.1.1)
7. The Reactor Vessel Integrity Program will be enhanced prior to the period of extended operation. (B.1.6)
8. The Steam Generator Program will be enhanced prior to the period of extended operation. (B.1.7)
9. The Bolting Integrity Program will be enhanced prior to the period of extended operation. (B.2.1)
10. The Boric Acid Corrosion Prevention Program will be enhanced prior to the period of extended operation. (B.2.2)
11. The Cooling Water Corrosion Program will be enhanced prior to the period of extended operation. (B.2.3)
12. The Diesel Fuel Monitoring and Storage Program will be enhanced (including inspections to confirm the effectiveness of fuel oil chemistry control) prior to the period of extended operation. (3.3, B.2.4)
13. The Fatigue Monitoring Program will be enhanced prior to the period of extended operation. (B.2.5)
14. The Fire Protection Program will be enhanced prior to the period of extended operation. (B.2.6)
15. The Overhead Load Handling Systems Inspection Program will be enhanced prior to the period of extended operation. (B.2.7)
16. The Periodic Surveillance and Preventative Maintenance Program will be enhanced prior to the period of extended operation. (B.2.8)
17. The Reactor Vessel Internals Inspection Program will be enhanced prior to the period of extended operation. (B.2.9)
18. The Structures Monitoring Program will be enhanced prior to the period of extended operation. (B.2.10)

19. The Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Program will be enhanced prior to the period of extended operation. (B.2.11)
20. The Alloy 600 Program will be established prior to the period of extended operation. (B.3.1)
21. The Buried Surfaces External Corrosion Program will be established prior to the period of extended operation. (B.3.2)
22. The General Corrosion of External Surfaces Program will be established prior to the period of extended operation. (B.3.3)
23. The Non-EQ Cable Aging Management Program will be established prior to the period of extended operation. (B.3.4)
24. The One-Time Inspection Program will be established prior to the period of extended operation. (B.3.5)
25. The Selective Leaching Program will be established prior to the period of extended operation. (B.3.6)
26. Periodic monitoring of below-grade water chemistry will be conducted during the period of extended operation to demonstrate that the below-grade environment is not aggressive for structural concrete. (3.5)
27. Measures are in place to monitor for and prevent corrosion of the embedded containment liner. (3.5)

OPPD

Omaha Public Power District

APPLICATION FOR RENEWED OPERATING LICENSE



FORT CALHOUN STATION UNIT 1

JANUARY 2002

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This preface describes information location, layout, and editorial conventions in the Fort Calhoun Station Unit 1 License Renewal Application. Abbreviated names and acronyms are used throughout the application, and are defined in Table P.1 at the end of this preface. Among the most commonly used terms specific to this application are FCS (for Fort Calhoun Station) and USAR (for Updated Safety Analysis Report). Regulatory documents such as NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, and 10 CFR Part 54 - *Requirements for Renewal of Operating Licenses for Nuclear Power Plants* (the License Renewal Rule) are referred to by the document number, i.e., NUREG-1801 and 10 CFR 54, respectively.

Section 1 provides administrative information.

Section 2 provides the integrated plant assessment scoping and screening methodology and results. Section 2 describes and justifies the methodology used to determine the systems, structures, and components within the scope of license renewal and the structures and components subject to aging management review. Table 2.2-1 identifies those plant systems and structures that are within the scope of license renewal.

Subsections in Section 2 provide descriptions of systems, structures and commodities, along with their component types subject to aging management review and the associated intended functions. Also included in these discussions are references to system boundary drawings and the Updated Final Safety Analysis (USAR). The drawings are provided in a separate submittal, but are not part of this application. The subsections are divided into mechanical, structural, then electrical results.

Section 3 describes the results of the aging management reviews of the system and structural component types subject to aging management review, using NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, published July 2001, as the primary basis. Section 3 describes or references the processes used to identify aging effects requiring management, discusses the materials and environments which produce aging effects, identifies the aging effects requiring management, describes industry and operating experience with respect to the applicable aging effects, and identifies the aging management programs that will manage the aging effects requiring management.

On a systematic basis, Section 3 compiles the aging management review results for programs evaluated in NUREG-1801 that are relied on for license renewal into tables. There are also tables for system and structural component types subject to aging management review not evaluated in NUREG-1801.

Section 4 includes time-limited aging analyses, as defined by 10 CFR 54.3. It includes the identification of the component or subject and an explanation of the time-dependent aspects of the calculation or analysis. Section 4 includes a demonstration that the analyses remain valid for the period of extended operation, the analyses have been projected to the end of the period of extended operation, or the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. Section 4 also states that no 10

CFR 50.12 exemptions involving a time-limited aging analysis as defined in 10 CFR 54.3 are required during the period of extended operation.

Appendix A, the Updated Safety Analysis Report Supplement, provides a summary description of the programs and activities for managing the effects of aging for the period of extended operation. A summary description of the evaluation of time-limited aging analyses for the period of extended operation is also included.

Appendix B, Aging Management Activities, describes the aging management programs and activities and demonstrates that the aging effects on the components and structures within the scope of the license renewal rule will be managed such that they will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. The programs and activities that are credited for managing aging are characterized as existing activities, enhanced activities, or new activities. Appendix B also includes a matrix comparing FCS programs with those included in NUREG-1801.

Appendix C is not used.

Appendix D, Technical Specification Changes, concludes that no technical specification changes are necessary to manage the effects of aging during the period of extended operation.

Appendix E is the Environmental Information which fulfills the requirements of 10 CFR 54.23 and 10 CFR 51.53(c).

The information in Section 1 fulfills the requirements of 10 CFR 54.17 and 10 CFR 54.19. The information in Section 2, Section 3, and Appendix B fulfills the requirements of 10 CFR 54.21(a). The information in Section 4 fulfills the requirements of 10 CFR 54.21(c). The information in Appendix A fulfills the requirements of 10 CFR 54.21(d). The information in Appendix D fulfills the requirements of 10 CFR 54.22.

In the electronic version of this application, blue hyperlinks are provided in the text where related subsections, drawings, or USAR sections are mentioned.

TABLE P.1
List of Acronyms, Symbols, etc.

'	feet
"	inches
10 CFR #	Code of Federal Regulations, Title 10, Part #
10 CFR 54	10 CFR Part 54 - *Requirements for Renewal of Operating Licenses for Nuclear Power Plants*
AB	Auxiliary Boiler
ABB	Asea Brown Boveri
AFW	Auxiliary Feedwater
AMG	Aging Management Group
AMR	Aging Management Review
ANSI	American National Standards Institute
AOV	Air-Operated Valve
APCSB	Auxiliary and Power Conversion Systems Branch
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing Materials
ATWS	Anticipated Transients Without Scram
B&W	Babcock and Wilcox
BAC	Boric Acid Corrosion
BTP	Branch Technical Position
BWR	Boiling Water Reactor
C	Celsius
CA-PA	Compressed Air
CASS	Cast Austenitic Stainless Steel
CCNPP	Calvert Cliffs Nuclear Power Plant
CCW	Component Cooling Water
CE	Combustion Engineering
CEA	Control Element Assembly

TABLE P.1 (CONTINUED)
List of Acronyms, Symbols, etc.

CEOG	Combustion Engineering Owners Group
CFR	Code of Federal Regulations
CIAS	Containment Isolation Actuation Signal
CLB	Current Licensing Basis
CPU	Central Processing Unit
CQE	Critical Quality Element
CR	Condition Report
CRD	Control Rod Drive
CRDM	Control Rod Drive Mechanism
CRHS	Containment Radiation High Signal
CS	Containment Spray
CSB	Core Support Barrel
CUF	Cumulative Usage Factors
CVCS	Chemical and Volume Control System
CVCS	Chemical & Volume Control System
DAS	Data Acquisition System
DBD	Design Basis Document
DBE	Design Basis Event
DBE	Design Basis Event
DC	Direct Current
Dc	Direct Current
Deg	degrees
DG	Diesel Generator
DSS	Diverse Scram System
DW	Demineralized Water
E&C	Electrical and Controls
EAS	Emergency Alarm System
ECT	eddy current testing

TABLE P.1 (CONTINUED)
List of Acronyms, Symbols, etc.

EdF	Electricite deFrance
EEQ	Electrical Equipment Qualification
EFWST	Emergency Feedwater Storage Tank
EFWST	Emergency Feedwater Storage Tank
EOF	Emergency Operations Facility
EPRI	Electric Power Research Institute
EQ	Environmental Qualification
ERF	Emergency Response Facility
ESFAS	Engineered Safety Features Actuation System
F	Fahrenheit
FAC	Flow-accelerated Corrosion
FACTS	Fort Calhoun Automatic Cable Tracking System
FAX	facsimile
FCS	Fort Calhoun Station
FIX	Filtration/ion Exchange
FO	Fuel Oil
FP	Fire Protection
FR	Federal Register
FSAR	Final Safety Analysis Report
FW	Feedwater
FW-BD	Feedwater Blowdown
GALL	Generic Aging Lessons Learned
GE	General Electric
GL	Generic Letter
GSI	Generic Safety Issue
GTC	Gaitronics Transistorized Communication
HELB	High Energy Line Break
HEPA	High Efficiency Particulate Air

TABLE P.1 (CONTINUED)
List of Acronyms, Symbols, etc.

HPSI	High Pressure Safety Injection
HVAC	Heating, Ventilation and Air Conditioning
IASCC	Irradiation-assisted Stress Corrosion Cracking
ICI	In-Core Instrumentation
IGA	Intergranular Attack
IGSCC	Intergranular Stress Corrosion Cracking
IPA	Integrated Plant Assessment
IR	Insulation Resistance
ISI	Inservice Inspection
KV	kilovolt
LBB	Leak Before Break
LO	Lube Oil
LOCA	Loss of Coolant Accident
LPSI	Low Pressure Safety Injection
LR	License Renewal
LRA	License Renewal Application
LTOP	Low Temperature Overpressure Protection
MCC	Motor Control Center
MFW	Main Feedwater
MIC	Microbiologically Influenced Corrosion
MS	Main Steam
MSIV	Main Steam Isolation Valve
MW	megawatt
MWt	Megawatts thermal
N/A	Not Applicable
NDE	Non-destructive Examination
NDTT	Nil Ductility Transition Temperature
NEI	Nuclear Energy Institute

TABLE P.1 (CONTINUED)
List of Acronyms, Symbols, etc.

NFPA	National Fire Protection Association
NG	Nitrogen Gas
NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission
NSR	Non-Safety-Related
NSSS	Nuclear Steam Supply System
NUREG-1800	NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, published July 2001
NUREG-1801	NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, published July 2001
OD	Outside Diameter
ODCM	Off-Site Dose Calculation Manual
ODSCC	Outside Diameter Stress Corrosion Cracking
OPPD	Omaha Public Power District
P&ID	Piping and Instrumentation Diagram
P/T	Pressure/Temperature
PB	Pressure Boundary
PC	Plant Computer
PM	Preventive maintenance
PORV	Power Operated Relief Valve
PTS	Pressurized Thermal Shock
PWR	Pressurized Water Reactor
PWSCC	Primary Water Stress Corrosion Cracking
PZR	Pressurizer
QSPDS	Qualified Safety Parameter Display System
RAMS	Resource Acquisition Management System (site database)
RC	Reactor Coolant
RCGVS	Reactor Coolant Vent Gas System

TABLE P.1 (CONTINUED)
List of Acronyms, Symbols, etc.

RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Coolant System
RG	Regulatory Guide
RTD	Resistance Temperature Device
RT_{PTS}	Transition Temperature for Pressurized Thermal Shock
RV	Reactor Vessel
RV	Relief Valve
RVI	Reactor Vessel Internals
RW	Raw Water
SBO	Station Blackout
SC	Structure or Component
SCC	Stress Corrosion Cracking
SCs	Structures and Components
SDC	Shutdown Cooling
SG	Steam Generator
SGIS	Steam Generator Isolation Signal
SI	Safety Injection
SIAS	Safety Injection Actuation Signal
SIRWT	Safety Injection and Refueling Water Tank
SOC	Statements of Consideration
SPDS	Safety Parameter Display System
SR	Safety-Related
SRO	Senior Reactor Operator
SRP	Standard Review Plan
SS	System and Structure
SSCs	Systems, Structures, and Components

TABLE P.1 (CONTINUED)
List of Acronyms, Symbols, etc.

SSEL	Safe Shutdown Equipment List
SV	Safety Valve
TIC	Temperature Indication Controller
TID	Total Integrated Dose
TLAA	Time Limited Aging Analysis
TSC	Technical Support Center
TSP	Tri-Sodium Phosphate
UGS	Upper Guide Structure
USAR	Updated Safety Analysis Report
USAS	United States of America Standard
USI	Unresolved Safety Issue
USNRC	United States Nuclear Regulatory Commission
UV	Ultraviolet
V	Volt
VAC	Volts – alternating current
VCT	Volume Control Tank
VDC	Volts – direct current
WD-L	Liquid Waste Disposal

1.0 ADMINISTRATIVE INFORMATION

1.1 PURPOSE AND GENERAL INFORMATION

Pursuant to Part 54 of Title 10 of the Code of Federal Regulations (10 CFR 54), this application seeks renewal for an additional 20 year term of the facility operating license (DPR-40) for Fort Calhoun Station Unit 1. The operating license currently expires at midnight, August 9, 2013. Following is the general information required by 10 CFR 54.17 and 10 CFR 54.19.

1.2 NAME OF APPLICANT

Omaha Public Power District (OPPD)

1.3 ADDRESS OF APPLICANT

Omaha Public Power District
444 South 16th Street Mall
Omaha, Nebraska 68102-2247

Address of Fort Calhoun Station

Omaha Public Power District
Fort Calhoun Station
Post Office Box 550
Hwy. 75 - North of Fort Calhoun
Fort Calhoun, Nebraska 68023-0550

1.4 DESCRIPTION OF BUSINESS OR OCCUPATION OF APPLICANT

Headquartered in Omaha, Nebraska, the Omaha Public Power District is a public corporation and a self-supporting subdivision of state government. All revenue for operating expenses and routine improvements and additions is acquired through the sale of electricity and related services. OPPD owns and operates its own generation, transmission and distribution facilities. Funds for major construction expenditures come from the sale of revenue bonds on the private bond market. OPPD receives no tax income and has no taxation power.

OPPD's service territory covers approximately 5000 square miles in 13 counties in southeastern Nebraska. OPPD supplies electric service to nearly 300,000 residential, commercial, and industrial customers. To service this area, OPPD operates generating facilities with an installed capacity of over 2200 megawatts (MW) electric, including Fort Calhoun Station.

1.5 ORGANIZATION AND MANAGEMENT OF APPLICANT

OPPD is a public utility incorporated under the laws of the State of Nebraska, with its principal office located in Omaha, Nebraska. OPPD is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. OPPD makes this application on its own behalf and is not acting as an agent or representative of any other person.

All corporate powers are vested in OPPD's eight-member Board of Directors. These Directors are publicly elected to six-year terms from geographical districts within OPPD's 13-county service area, and each Director represents a substantially equal number of people. Vacancies on the Board are filled through appointments by the Governor.

Under the provisions of the by-laws of the Omaha Public Power District, the President is appointed by the Board of Directors to be Chief Executive Officer with the responsibility to manage, conduct and administer the affairs of the utility in an efficient and economical manner. The Board also appoints the Vice Presidents and other assistants considered necessary for the proper operation of the utility.

The names and business addresses of OPPD's directors and principal officers are listed below. All persons listed are U.S. citizens.

Omaha Public Power District - Directors

Michael J. Cavanaugh Chairman of the Board	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Geoffrey C. Hall Vice Chairman	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Del D. Weber Secretary	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Anne L. McGuire Treasurer	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
N.P. Dodge, Jr.	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247

Omaha Public Power District - Directors (continued)

Fred J. Ulrich	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Kirk Brumbaugh	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
John K. Green	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247

Omaha Public Power District - Principal Officers

Fred M. Peterson President Chief Executive Officer	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Timothy J. Burke Vice President	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
William D. Dermyer Vice President	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Roger L. Sorensen Vice President	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
W. Gary Gates Vice President	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Dale F. Widoe Vice President	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247
Charles N. Eldred Vice President	Omaha Public Power District 444 South 16th Street Mall Omaha, Nebraska 68102-2247

1.6 CLASS AND PERIOD OF LICENSE SOUGHT

OPPD requests renewal of the Class 104b operating license for Fort Calhoun Station Unit 1 (license number DPR-40) for a period of 20 years beyond the expiration of the current license. License renewal would extend the operating license from midnight August 9, 2013, until midnight August 9, 2033. This application includes a request for renewal of those NRC source material, special nuclear material, and byproduct material licenses that are currently subsumed into or combined with the current operating license. The facility will continue to be known as the Fort Calhoun Station and will continue to generate electric power during the renewal period.

1.7 ALTERATION SCHEDULE

OPPD does not propose to construct or alter any production or utilization facility in connection with this renewal application.

1.8 REGULATORY AGENCIES HAVING JURISDICTION AND APPROPRIATE NEWS PUBLICATIONS

The OPPD Board of Directors sets all rates and charges for all electrical energy and other commodities, services, or facilities sold, furnished, or supplied by OPPD. The Federal Energy Regulatory Commission has jurisdiction to settle disputes regarding rates for wholesale transmission services. The Nebraska Power Review Board can recommend resolution of disputes between retail electric suppliers concerning rates for service between such suppliers. The Nebraska Power Review Board also approves construction of major additional generation or transmission facilities.

The addresses of the agencies cited are:

Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

Nebraska Power Review Board
301 Centennial Mall South
P.O. Box 94713
Lincoln, NE 68509-4713

The area news publications and their associated addresses are:

Omaha World Herald
World Herald Square
Omaha, Nebraska 68102

Washington County Enterprise
138 North 16th Street
Blair, Nebraska 68008

1.9 CONFORMING CHANGES TO THE STANDARD INDEMNITY AGREEMENT

The requirements at 10 CFR 54.19(b) state that license renewal applications include, "...conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The current indemnity agreement for Fort Calhoun Station Unit 1 does not contain a specific expiration term for the operating license. Therefore, conforming changes to account for the expiration term of the proposed renewed license are not necessary, unless the license number is changed upon issuance of the renewed license.

1.10 RESTRICTED DATA AGREEMENT

With regard to the requirements of 10 CFR 54.17(f), this application does not contain any "Restricted Data," as that term is defined in the Atomic Energy Act of 1954, as amended, or other defense information, and it is not expected that any such information will become involved in these licensed activities.

In accordance with the requirements of 10 CFR 54.17(g), OPPD will not permit any individual to have access to, or any facility to possess restricted data or classified national security information until the individual and/or facility has been approved for such access under the provisions of 10 CFR Parts 25 and/or 95.

1.11 DESCRIPTION OF FORT CALHOUN STATION

The site for the single unit Fort Calhoun Station contains 660.46 acres on the west bank of the Missouri River, approximately 19.4 miles north of Omaha, Nebraska. The Fort Calhoun Station Unit 1 nuclear steam supply system includes a pressurized water reactor designed by Combustion Engineering. It is designed to produce a core thermal power output of 1500 MWt. The steam and power conversion system, including its turbine generator, is designed to permit generation of a net electrical output of approximately 475 MW. Descriptions of Fort Calhoun Station systems and structures can be found in the Updated Safety Analysis Report (USAR). Additional descriptive information about systems, structures, and components is also provided in Section 2 of this application, and references to the USAR are provided where pertinent.

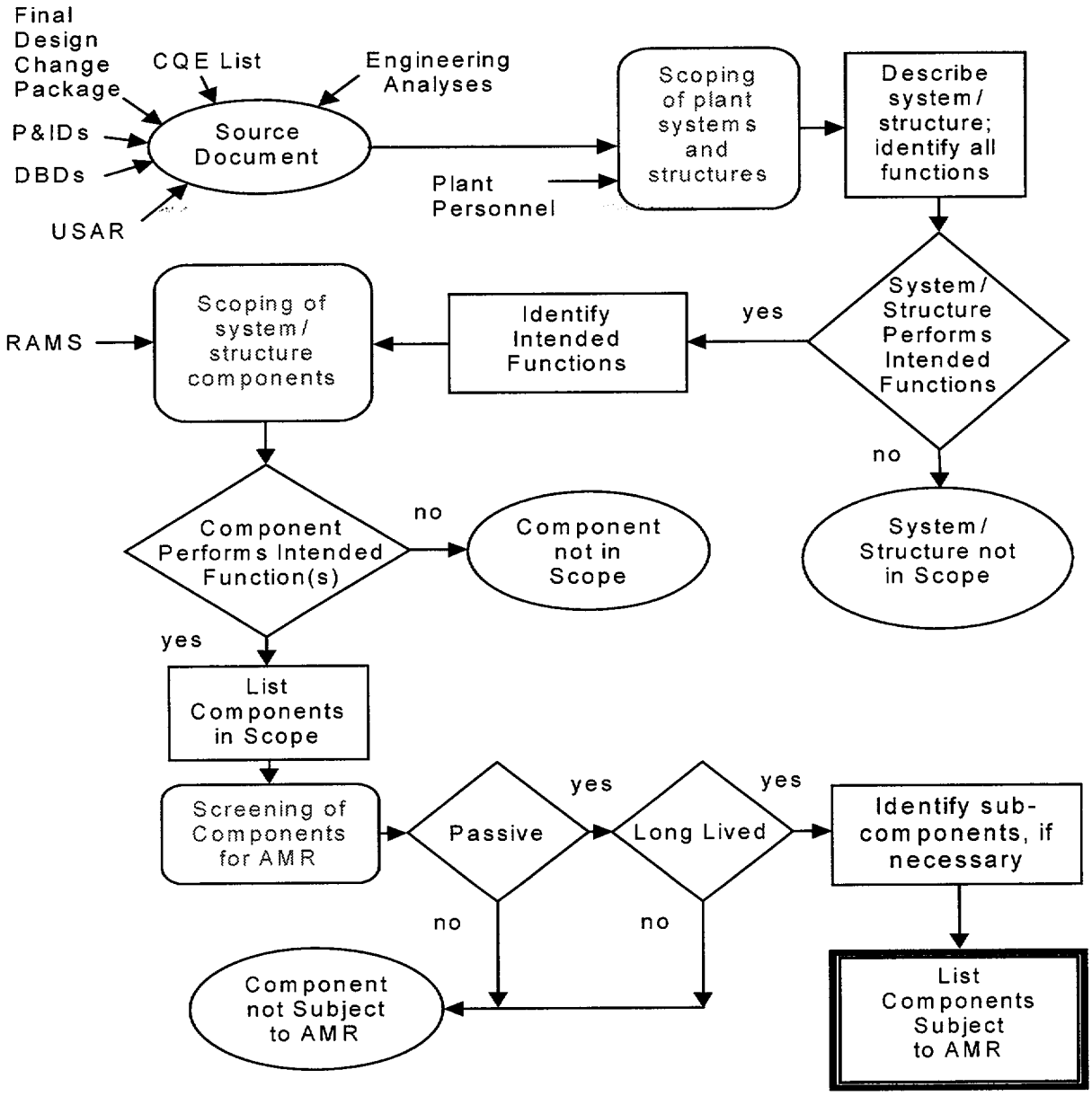
2.0 SCOPING AND SCREENING METHODOLOGY FOR IDENTIFYING STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW, AND IMPLEMENTATION RESULTS

2.1 SCOPING AND SCREENING METHODOLOGY

2.1.1 INTRODUCTION

The purpose of this section is to document the methodology used for License Renewal (LR) scoping and screening activities to satisfy 10 CFR 54.4 and 54.21(a)(1) at Fort Calhoun Station (FCS). NEI 95-10 (Reference 2.1-1) was used as the starting point and primary input document to develop this methodology. The overall scoping process and generic guidance of NEI 95-10 were followed to accomplish this goal, but the methods described herein are specific to FCS due to the nature of the Current Licensing Basis (CLB). This process is the first step of the Integrated Plant Assessment (IPA) review in order to produce the information specified in 10 CFR 54.21 (Contents of Application - Technical Information). Performance of the activities described in this section will identify the plant structures and components (SCs) which are subject to aging management review (AMR). This methodology is required by 10 CFR 54.21(a)(2) and must be included in the license renewal application (LRA). The overall process is illustrated in Figure 2.1-1.

Figure 2.1-1: Overall LR Scoping and Screening Process



2.1.2 DEFINITIONS

A number of terms are used throughout this application. The terms are defined below. Some of the definitions, identified by *, are derived from 10 CFR 54 at §54.3, §54.4, §54.21, and §54.31, or from the associated Statements of Consideration (SOC). The specific 10 CFR 54 section or SOC page identifier which is the source of the definition is cited in brackets [ ] for definitions marked with an asterisk.

Critical Quality Elements (CQEs) - Those structures, systems, components or items whose satisfactory performance is required to prevent or mitigate the consequences of accidents that could cause undue risk to the health and safety of the public.

Current Licensing Basis* (CLB) - The set of NRC requirements applicable to a specific plant and a licensee's written commitments for assuring compliance with and operation within applicable NRC requirements, and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR Parts 2, 19, 20, 21, 30, 40, 50, 51, 54, 55, 70, 72, 73, 100, and appendices thereto; orders; license conditions; exemptions; and technical specifications. It also includes the plant-specific design basis information defined in 10 CFR 50.2, as documented in the most recent Final Safety Analysis Report (FSAR) as required by 10 CFR 50.71, and the licensee's commitments remaining in effect that were made in docketed licensing correspondence, such as licensee responses to NRC Bulletins, Generic Letters, and Enforcement Actions, as well as licensee commitments documented in NRC Safety Evaluations or Licensee Event Reports. [§54.3]

Integrated Plant Assessment* (IPA) - A licensee assessment that demonstrates that a nuclear power plant facility's structures and components requiring AMR in accordance with §54.21(a) for LR have been identified and that the effects of aging on the functionality of such SCs will be managed to maintain the CLB, such that there is an acceptable level of safety during the period of extended operations. [§54.3]

Intended Functions* - Those functions that are the bases for including systems, structures, and components (SSCs) within the scope of LR. [§54.4b]

License Renewal Boundary - That portion of an in scope system which performs an intended function as defined in the License Renewal Rule.

Limited Critical Quality Elements (Limited CQEs) - Those structures, systems, components, or items whose satisfactory performance is required to prevent or mitigate the consequences of failures of those structures, systems, components, or items identified as CQE.

Long-Lived* - Those components not subject to periodic replacement based on qualified life or specified time period. [§54.21(a)(1)]

Non-Critical Quality Elements (Non-CQEs) - Those structures, systems, components, or items that have no special performance or quality requirements as defined for CQE or Limited CQE. The quality assurance activities performed for Non-CQE are of a sufficient level to ensure the reliable generation of power.

Passive* - A component is said to be passive if it performs an intended function without moving parts or without a change in configuration or properties. [§54.21(a)(1)].

Period of Extended Operations - The additional amount of time beyond the expiration of the current operating license that is requested in the license renewal application.

Structure - The term structure, when used as a stand-alone term in this methodology, refers to a building. When a component of a structure is referred to, the term "structural component" is used for clarity.

Structures and Components* (SCs) - The phrase "structures and components" applies to matters involving the IPA required by §54.21(a) because the AMR required within the IPA should be a component level review rather than a more general system level review. [60 FR 22462] In this Methodology, the term "structural components and components" refers to the component level concept.

System Functions – Those functions performed by a system that may or may not be an Intended Function.

Systems, Structures, and Components* (SSCs) - Throughout these discussions, the term "systems, structures, and components" is used when referring to matters involving the discussions of the overall renewal review. [60 FR 22462]

2.1.3 CURRENT LICENSING BASIS INFORMATION

The Current Licensing Basis (CLB) of FCS contains information that assists in identifying the scope of SSCs required for LR. CLB discussions involving the correlation between Safety Classifications (Class 1, Class 2, etc.) and Quality Assurance classifications (CQE, Non-CQE, etc.) can be found in Reference 2.1-2. This section of the methodology compares the applicable portion of the CLB, as contained in the CQE List, to the requirements of 10 CFR 54.

2.1.3.1 CQE LIST

The CQE List contains clearly defined terms related to the quality requirements of SSCs:

- Critical Quality Elements (CQEs)
- Limited Critical Quality Elements (Limited CQEs)
- Non-Critical Quality Elements (Non-CQEs)

These terms were defined previously.

2.1.3.2 10 CFR 54.4

This rule contains a similar set of definitions to describe the SSCs within scope of LR:

§54.4 Criterion 1

(1) Safety-related systems, structures, and components which are those relied on to remain functional during and following design-basis events [as defined in 10 CFR 50.49 (b)(1)] to ensure the following functions:

(i) The integrity of the reactor coolant pressure boundary;

(ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or

(iii) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable.

§54.4 Criterion 2

(2) All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraph (a)(1)(i), (ii) or (iii) of this section (i.e., §54.4).

§54.4 Criterion 3

(3) All 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), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

2.1.3.3 COMPARISON

By carefully reviewing the above definitions relative to FCS classifications, it becomes clear that SSCs designated as CQE satisfy Criterion 1, and SSCs designated as Limited CQE satisfy Criterion 2. The CQE List also identifies as CQE vital auxiliaries such as electric power distribution, cooling water, and heating, ventilation, and air conditioning systems that are required for mitigation of DBEs. By relying on the CQE List, all CQE SSCs will be identified, as well as all SSCs that could fail and prevent the functioning of CQE SSCs. This identification is not limited to first level, second level, or any specific level of support equipment. Nor is it limited to only the events described in Chapter 14 of the USAR. Rather, the scoping is performed using criteria consistent with the first two criteria of §54.4.

The CQE classifications have been validated to be accurate and conservative in the following ways:

- OPPD has relied on this classification system for years to identify purchasing, design, and installation requirements for those components, thereby providing a constant check of, and reaffirmation of, the classifications.
- A comprehensive review was conducted by a team of qualified reviewers, including SROs, for the purpose of ascertaining the accuracy and completeness of the classifications. This review demonstrated a high level of confidence in the classification process.
- Activities conducted to identify SSCs subject to the requirements of the Maintenance Rule have also shown the classification scheme to be accurate and conservative.

With regard to Criterion 3, plant evaluations have been performed to demonstrate compliance with the regulations identified in §54.4(a)(3). These evaluations were reviewed to identify Non-CQE SSCs that are relied on to mitigate any of the five regulated events. As is the case for Criteria 1 and 2, an SSC was determined to be within the scope of LR when the mitigation function or support function associated with it was credited in the analysis or evaluation.

Therefore, by using the above guidance, OPPD concludes that the FCS scoping process is consistent with the intent stated in the SOC for 10 CFR 54.

> An applicant for LR should rely on the plant's CLB, actual plant-specific experience, industry-wide operating experience, as appropriate, and existing engineering evaluations to determine those safety-related systems, structures, and components that are the initial focus of the LR review. [60 FR 22467]

The process is also consistent with the scoping guidance contained in the Nuclear Regulatory Commission Staff's correspondence addressing License Renewal Issue 98-0082 (Reference 2.1-3).

2.1.4 PLANT LEVEL SCOPING OF SYSTEMS AND STRUCTURES

The IPA scoping process was performed in two steps, plant level scoping and system level scoping. The first step was the identification of all plant systems and structures and is describe in this section. For those systems and structures determined to be in scope a system level scoping is performed to identify the components within the systems or structures which support the system/structure intended functions. The system level scoping methodology is addressed in Section 2.1.5.

2.1.4.1 PLANT SYSTEMS

§54.4 Criteria 1 and 2

Primary inputs to the Criteria 1 and 2 scoping task include the USAR, RAMS (FCS Equipment Database), DBDs, and P&IDs. Interviews with experienced plant personnel were conducted as necessary to assure complete review of FCS systems. Systems in scope per Criteria 1 and 2 are those defined by the CQE List as being or containing CQE or Limited CQE SSCs in the USAR, DBDs, or P&IDs.

Piping Between Safety Related Boundaries and Seismic Support

Non-CQE piping between safety related boundaries and seismic anchors is within the scope of license renewal. Its intended function is to provide structural support to CQE equipment. The piping is subject to aging management review and is evaluated the same as the piping on the CQE side of the boundary.

Scoping of Components Supported by Seismic II/I Supports

NRC provides guidance to the staff on this issue in the Standard Review Plan, Table 2.1-2 (Reference 2.1-4) under hypothetical failures for §54.4(a)(2). The information there is consistent with and refers to a letter from Grimes, NRC, to Walters, NEI, dated August 5, 1999 (Reference 2.1-3). This letter provides NRC resolution to the "scoping guidance" issue. It states in the resolution:

> ...an applicant needs to consider the following: ... The nonsafety related SSCs (including certain second-, third- or fourth-level

> support systems) whose failure can prevent satisfactory accomplishment of the safety-related function identified under 10 CFR 54.4(a)(1). In order to identify such SSCs, an applicant needs to consider those failures identified in the CLB and, to the extent that it is applicable and appropriate, any plant specific or industry-wide operating experience that is specifically applicable to the facility.

The SRP guidance concludes, "The applicant need not consider hypothetical failures that are not part of the CLB and that have not been previously experienced."

This is very similar to the discussion in the Statements of Consideration, III.c.(iii), Bounding the Scope of Review [60 FR 22467]. The Commission, in discussing §54.4(a)(2), states, "consideration of hypothetical failures that are not part of the CLB and that have not been previously experienced is not required." The SOC continues, "... the Commission intends to include equipment that is not seismically qualified located near seismically qualified equipment (i.e., Seismic II/I equipment already identified in the plant CLB) in this set of nonsafety- related systems, structures and components."

OPPD has included, within the scope of license renewal, all high energy line piping. This resulted from consideration of NRC Generic Letter 89-08, *Erosion Corrosion-Induced Pipe Wall Thinning* and Information Notice 2001-09, *Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor.* The review of site and industry operating experience did not indicate any other non-hypothetical events that are applicable to FCS.

§54.4 Criterion 3

The system scoping approach used for each item of Criterion 3 is given below.

Fire Protection (FP)

The SSCs satisfying the safe shutdown requirements of 10 CFR 50 Appendix R are contained in the safe shutdown equipment list (SSEL). There are no unique components credited soley for Appendix R safe shutdown. The components in the SSEL were captured by the review conducted for Criteria 1 & 2. A review of the SSEL was conducted to verify this statement.

The Non-CQE FP SSCs satisfying the regulation (10 CFR 50.48) are identified in the Fire Hazards Analysis.

Environmental Qualification (EQ)

The FCS EQ Manual contains a complete list of equipment which must meet the requirements of 10 CFR 50.49. As stated in 60 FR 22466, "Licensees may rely upon their listing of 10 CFR 50.49 equipment, as required by 10 CFR 50.49(d), for purposes of satisfying §54.4 with respect to equipment within the scope of §50.49."

All components in the manual are CQE or Limited CQE and were captured by the review conducted for Criteria 1 and 2. A review of the manual was conducted to verify this statement.

Pressurized Thermal Shock (PTS)

OPPD performed an evaluation in accordance with Regulatory Guide (RG) 1.154 in order to satisfy 10 CFR 50.61 requirements. No additional FCS equipment is included within the scope of LR due to the PTS Rule.

Anticipated Transients Without Scram (ATWS)

The analysis that addresses the 10 CFR 50.62 requirements for ATWS is contained in an FCS Final Design Package. A Diverse Scram System (DSS) was designed, purchased, and installed as CQE in accordance with this package. Therefore, this system was captured by the review conducted for Criterion 1. A review of the package was conducted to verify that all credited SSs were captured.

Station Blackout (SBO)

The SBO coping assessment for 10 CFR 50.63 is contained in an FCS Engineering Analysis. All SSCs credited in the assessment are CQE and were captured by the review conducted for Criterion 1. A review of the analysis was conducted to verify this.

2.1.4.2 STRUCTURES

The Containment Building, Auxiliary Building, and Intake Structure are identified as Class 1 structures in plant CLB documentation and are within the scope of license renewal based on scoping Criterion 1. Non-Class 1 structures (Turbine Building and Service Building) required evaluation of plant documentation (e.g., DBDs, CQE List), the USAR, and the FCS docket to determine their applicability to scoping Criterion 2 or 3. For example, certain plant structures or structural components are credited in OPPD responses to the requirements of 10 CFR 50.48 (e.g., fire barriers or containment of flammable liquids). Interviews with experienced plant personnel were conducted as necessary to assure complete review of FCS structures. The Turbine Building and Service Building are within the scope of license renewal.

As a result of this review, the intended functions of the structural components were identified from the applicable source documents. The primary FCS inputs to be used in identifying the intended functions for structural components were the DBDs, CQE List, USAR, and FCS docket.

Also, NEI 95-10 (Reference 2.1-1) and the Calvert Cliffs and Oconee LR scoping methodologies (contained in References 2.1-5 and 2.1-6) were consulted for structural component intended functions previously identified and accepted by the NRC. The types of intended functions included:

- Provide structural and/or functional support to CQE equipment.
- Provide shelter/protection to CQE equipment.
- Serve as a PB or a fission product retention barrier to protect public health and safety in the event of any postulated DBEs.
- Provide Shielding against radiation.
- Provide Shielding against High Energy Line Breaks.
- Provide whip restraint.
- Provide heat sink during design basis event.
- Serve as a missile barrier (internal or external).
- Provide structural and/or functional support to Non-CQE equipment whose failure could directly prevent satisfactory accomplishment of any of the required CQE functions.
- Provide flood protection barrier.
- Provide a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
- Provide source of cooling water for plant shutdown.

2.1.4.3 REPORT FOR SCOPING OF PLANT SYSTEMS AND STRUCTURES

A thorough examination of the input documents was conducted and a scoping report was prepared for each system and structure within the scope of LR. Intended functions were extracted primarily from the functions listed in the DBDs. The functions, including those identified as non-safety related, were reviewed for applicability, and the justification for their inclusion or exclusion as intended functions was documented. Scoping reports were prepared to encompass commodities such as cables, electrical penetration assemblies, containment isolation components of Non-CQE systems, heavy load handling equipment, and component supports, in addition to specific systems and structures. Each scoping report contains, as a minimum:

(1) a brief description of the SSs or commodity including a list of the major components, major system interfaces, and a clearly defined LR assessment boundary;

(2) a list of intended functions cross-referenced to the source document(s) from which they were extracted; and

(3) an annotated drawing, where applicable, indicating the boundaries of the SSs determined to be in scope.

2.1.5 SCOPING OF SYSTEM/STRUCTURE COMPONENTS

The purpose of this activity is to compile a complete list of SCs that contribute to the ability to perform the intended functions identified during the process for scoping of plant systems and structures. As a minimum, the inputs described below were used for this activity.

2.1.5.1 MECHANICAL SYSTEMS

For mechanical systems, components typically have unique equipment identifiers. These mechanical components are listed in the RAMS database. Similar to the process for scoping of plant systems and structures, the FCS safety classification system is the method relied on for identifying components that are in scope per Criteria 1 and 2. Components that satisfy Criteria 1 and 2 are, simply, all those that are defined by the CQE List as being CQE or Limited CQE.

Scoping of system/structure components that meet Criterion 3 (i.e., non-CQE components) was conducted by a review of documents, as explained above for the system level scoping. For four of the regulated events, (FP, EQ, ATWS, and SBO), a detailed review was conducted of the appropriate supporting documents for verification. No additional equipment is included within the scope of LR due to the PTS Rule.

The P&IDs contain safety classification flags for each system indicating the extent of the system that is within the scope of license renewal. A list of CQE and Limited CQE (and Non-CQE for FP) components was extracted from the site equipment database (RAMS) for each system determined to be in scope. Since certain components, such as piping, did not have unique identifiers in the database, additions were made to the list to completely describe all of the components contributing to a particular system's ability to perform its intended functions. Some of these components (e.g., component supports) were scoped as commodity groups as discussed in 2.1.5.4. Also, components were broken into subcomponents when deemed necessary.

2.1.5.2 ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS

Electrical, instrumentation and control systems were scoped using the same method as for mechanical systems described above. A list of CQE and Limited CQE components was extracted from RAMS for each system determined to be in scope. Since certain components did not have unique identifiers in the database, additions were made to the list, as necessary, to clearly indicate the extent of the system that is identified as within scope. The types of electrical components included: alarms, analyzers, breakers, solenoid operators, switches, RTDs, transducers, motors, heat tracing, recorders, relays, and panels. Some of these

components (e.g., cables, electrical penetration assemblies) were scoped as commodity groups as discussed in 2.1.5.4. That scoping involved the use of FACTS (Fort Calhoun Automatic Cable Tracking System). FACTS is a CQE controlled database that is maintained separately from RAMS.

2.1.5.3 STRUCTURES

For structures determined to be in scope as described above, structural component types within the boundaries were identified. Since the majority of structural components were not already identified in RAMS, a list of structural components within the evaluation boundaries was prepared for each structure determined to be in scope. The primary FCS inputs to be used in preparing the lists were the USAR, the CQE List, DBDs, and civil and architectural drawings. The Calvert Cliffs and Oconee methodologies (contained in References 2.1-5 and 2.1-6) were also consulted to identify generic lists of structural components that have been accepted by the NRC. The types of structural components included were the following:

- **Concrete** - concrete above grade, concrete below grade, interior concrete, concrete in raw water, masonry, grout. These generic types include but are not limited to foundations, basemats, walls, columns, beams, lintels, sumps, floor slabs, roof slabs, missile shields, radiation shields, embedded steel, and rebar.
- **Steel** - carbon structural steel in ambient air, carbon structural steel in outside air, carbon structural steel in raw water, carbon structural steel in borated water, stainless steel in ambient air, stainless steel in outside air, stainless steel in borated water. These generic types include but are not limited to columns, beams, lintels, missile shields, pipe whip restraints, stairs, embedded steel, and anchors.
- **Unique** - tendons, liners, seals, architectural panels, fire barriers, pressure relief panels, containment penetrations.

The lists were supplemented by plant drawings and/or written descriptions, as deemed necessary, to clearly indicate all structural components contributing to the structure's functions.

As each list of structural components was produced, a determination was made whether they support the structure's ability to perform an intended function(s). If a structural component supported the structure's ability to perform any one of the intended functions, the structural component automatically was included as within scope. Only if it could be shown that the structural component did not support the structure's ability to perform any of the intended functions was the structural component listed as out of scope. In those cases, an explanation of the basis for the out-of-scope determination was provided.

2.1.5.4 COMMODITY GROUPS

Since some types of components have materials and environments that are similar for many systems or structures, scoping by commodity groups provides an efficient method to evaluate components that perform the same intended function and are constructed with similar materials and operate under similar environmental conditions. Review of the component types determined what could be evaluated as commodities. Commodity groups were then assembled from RAMS and FACTS.

The resulting commodities are:

- Building Piles
- Bus Bars
- Cables and Connectors
- Component Supports
- Containment Penetration, and System Interface Components for Non-CQE Systems
- Fuel Handling Equipment and Heavy Load Cranes

A unique process was required for power, control, and instrumentation cables due to the quantity and location of electrical cables plant wide. FACTS provides a listing of cables at FCS. The FACTS database was relied on to identify the scope of cables within the scope of license renewal. Those cables listed as CQE in this database are considered to be in scope due to Criterion 1. Criterion 2 does not apply to cables because FCS design precludes Non-CQE electrical failures from impacting CQE circuits, through fuse and breaker coordination, so no additional cables were scoped as within the scope of license renewal for this criterion. For Criterion 3, only the fire protection-related equipment would have associated cables that are not already in scope due to Criterion 1. In this case, the Appendix R cables have previously been identified. The list of Appendix R cables was used to identify those that needed to be added to the scope for license renewal. Cables associated with fire detection equipment do not have unique equipment identifiers at FCS, so they were identified uniquely, or as a commodity, through a review of plant documentation.

2.1.5.5 REPORTS FOR SCOPING OF SYSTEM/STRUCTURE COMPONENTS

Using the inputs described above, a Component Level Scoping Report was prepared for each system, structure, and commodity determined to be in scope. This document lists or describes in detail all components of the system, structure, or commodity that contribute to the ability to perform intended functions.

2.1.6 MECHANICAL, ELECTRICAL, STRUCTURAL AND COMODITY COMPONENT SCREENING

This section describes the Screening task. The purpose of this task was to determine which plant SCs are subject to Aging Management Review (AMR) in the IPA process. The output of this task describes those SCs which required further evaluation for the effects of aging in the AMR task. The AMR Screening task is governed by 10 CFR 54.21(a)(1):

> **§54.21(a)(1)**
>
> For those systems, structures, and components within the scope of this part, as delineated in §54.4, identify and list those structures and components subject to an AMR. Structures and components subject to an aging management review shall encompass those structures and components-
>
> (i) That perform an intended function, as described in §54.4 without moving parts or without a change in configuration or properties. These structures and components include, but are not limited to, pressure-retaining boundaries, component supports, reactor coolant pressure boundaries, the reactor vessel, core support structures, containment, seismic category I structures, electrical cables and connections, and electrical penetrations, excluding but not limited to, pumps (except casing), valves (except body), motors, batteries, relays, breakers, and transistors; and
>
> (ii) That are not subject to periodic replacement based on a qualified life or specified time period.

This activity determined which plant SCs are subject to AMR by screening, from the prepared lists and/or written descriptions, those SCs that meet certain conditions. These conditions are discussed in the following paragraphs.

2.1.6.1 PASSIVE COMPONENTS

The following components are considered active and are specifically excluded from AMR by 10 CFR 54.21(a)(1)(i): pumps (except casing), valves (except body), motors, diesel generators, air compressors, snubbers, the control rod drive, ventilation dampers, pressure transmitters, pressure indicators, water level indicators, switchgears, cooling fans, transistors, batteries, breakers, relays, switches, power inverters, circuit boards, battery chargers, and power supplies.

Only passive components, those that perform (or contribute to the performance of) an intended function without moving parts or without a change in configuration or properties, are subject to AMR. The following are examples of passive components:

- **Mechanical** - Piping, fasteners, pump casings, valve bodies, and heat exchangers.
- **Electrical & Control** - Cables and electrical penetration assemblies.
- **Structural** - Structures and structural components are nearly all passive by nature. Thus, nearly all structures and structural components that perform or contribute to the performance of an intended function are subject to AMR.
- **Commodities** - Cables and connectors, containment electrical penetrations, bus bars, duct banks, piles, fuel handling/heavy loads cranes and component supports.

More extensive listings of passive components are included as Appendix B to NEI 95-10 (Reference 2.1-1) and in Chapter 2 of NUREG-1800 (Reference 2.1-4). In addition, the NRC has issued correspondence addressing scoping and screening issues. Based on this correspondence, transformers, indicating lights, heat tracing, electric heaters (except pressure boundary portions), fuses, o-rings, gaskets, packing, component seals, and grease do not require AMR (References 2.1-7, 2.1-8 and 2.1-9).

2.1.6.2 LONG-LIVED COMPONENTS

Only long-lived components are subject to AMR. All passive SCs were reviewed to determine if they are subject to replacement based on qualified life or specified time period. Structures and components which are not subject to such replacement were classified as long-lived.

2.1.6.3 COMPONENT INTENDED FUNCTIONS

The intended functions that the components must be shown to fulfill are those functions that are the bases for including them within the scope of license renewal. A component function is an intended function if it must perform that function for the system to be able to perform the system intended function(s). For example, pressure boundary failure of a component would cause loss of inventory from the system, and the system would subsequently be unable to perform its intended function(s).

Component intended functions were identified for all passive, long-lived components and subcomponents, if applicable. If a subcomponent (e.g., valve internals) was determined not to perform an intended function, the subcomponent was not subject to AMR.

2.1.6.4 CONSUMABLES

In accordance with Reference 2.1-4:

> Consumables may be divided into the following four categories for the purpose of license renewal: (a) packing, gaskets, component seals, and O-rings; (b) structural sealants; (c) oil, grease, and component filters; and (d) system filters, fire extinguishers, fire hoses, and air packs. The consumables in both categories (a) and (b) are considered as subcomponents and are not explicitly called out in the scoping and screening procedures.

> Rather, they are implicitly included at the component level (e.g., if a valve is identified as being in scope, a seal in that valve would also be in scope as a subcomponent of that valve). For category (a), the applicant would be able to exclude these subcomponents using a clear basis, such as the example of ASME Section III not being relied on for pressure boundary.
>
> For category (b), these subcomponents may perform functions without moving parts or a change in configuration, and they are not typically replaced. It is expected that the applicant's structural AMP will address these items with respect to an AMR program on a plant-specific basis. The consumables in category (c) are short-lived and periodically replaced, and can be excluded from an AMR on that basis. Likewise, the consumables that fall within category (d) are typically replaced based on performance or condition monitoring that identifies whether these components are at the end of their qualified lives and may be excluded, on a plant-specific basis, from AMR under 10 CFR 54.21(a)(1)(ii). The applicant should identify the standards that are relied on for the replacement as part of the methodology description (for example, NFPA standards for fire protection equipment).

Packing, gaskets, component seals, and O-rings are excluded from aging management review at FCS as they are not considered pressure boundaries in ASME Section III or USAS B31.1 or USAS B31.7. Structural sealants are evaluated with the structures that contain them. Oil, grease, and component filters do not require aging management review as noted above. System filters, fire extinguishers, fire hoses, and air packs are routinely replaced. System filter replacement is performed in accordance with the FCS Preventive Maintenance Program. Fire extinguisher replacement is in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*. Fire hose replacement is in accordance with NFPA 1962, *Standard for the Care, Use and Service Testing of Fire Hose Including Couplings and Nozzles*. Air packs are replaced in accordance with ANSI Z88.2-1992, *Practices for Respiratory Protection*.

2.1.6.5 REPLACEMENT BASED ON PERFORMANCE OR CONDITION

From Reference 2.1-10:

> It is important to note, however, that the Commission has decided not to generically exclude passive structures and components that are replaced based on performance or condition from an [AMR]. Absent the specific nature of the performance or condition replacement criteria and the fact that the Commission has determined that the components with "passive" functions are not as readily monitorable as components with active functions, such generic exclusion is not appropriate. However, the Commission

> does not intend to preclude a license renewal applicant from providing site-specific justification in a license renewal application that a replacement program on the basis of performance or condition for a passive structure or component provides reasonable assurance that the intended function of the passive structure or component will be maintained in the period of extended operation. [60 FR 22478]

OPPD has credited replacement based on performance or condition in a limited number of cases. These are discussed in Section 3 of this application where appropriate.

2.1.6.6 COMPONENT SCREENING REPORTS

Using the guidance described above, a Screening Report was prepared for each Report for Scoping of System/Structure Components. Each Screening Report listed all components of the system, structure, or commodity that were subject to AMR.

2.2 PLANT LEVEL SCOPING RESULTS

The systems, structures, and commodities at FCS were evaluated as to whether or not they were within the scope of license renewal, using the methodology described in Section 2.1. The SSC list is a combination of all systems discussed in the USAR, Plant Database or Commodities created for License Renewal. Those systems or commodities not identified in the USAR are asterisked (*). The results are shown below in Table 2.2-1. For SSCs noted as within scope of license renewal, the section numbers of this application, where these SSCs are described, are given in parentheses.

TABLE 2.2-1
Plant Level Scoping Results

SSC	Within Scope of License Renewal?
120 VAC (2.5.10)	yes
120/208 VAC Miscellaneous Power Lighting	no
125 VDC (2.5.9)	yes
161 KV Substation Equipment	no
22 KV	no
277/480 Miscellaneous Power Lighting*	no
345 KV Substation Equipment	no
4160 VAC (2.5.6)	yes

TABLE 2.2-1 (CONTINUED)
Plant Level Scoping Results

SSC	Within Scope of License Renewal?
480 VAC Bus (2.5.7)	yes
480 VAC Motor Control Centers (2.5.8)	yes
Acetylene Gas*	no
Administration Building*	no
Argon Gas*	no
Auxiliary Boiler*	no
Auxiliary Boiler Fuel Oil (2.3.3.5)	yes
Auxiliary Building (2.4.2.1)	yes
Auxiliary Building Heating, Ventilation, and Air Conditioning (2.3.3.11)	yes
Auxiliary Feedwater (2.3.4.2)	yes
Auxiliary Instrument Panel (2.5.15)	yes
Auxiliary Steam	no
Blowpipe System*	yes[1]
Building Piles (2.4.2.4)	yes
Bus Bars (2.5.20)	yes
Cables and Connectors (2.5.1)	yes
Carbon Dioxide Gas*	no
Chem/RP Building Heating, Ventilation, and Air Conditioning	no
Chemical and Volume Control (2.3.3.1)	yes
Chemistry and Radiation Protection Building	no
Circulating Water	no
Communications (2.5.18)	yes
Component Cooling (2.3.3.16)	yes
Component Supports (2.4.2.6)	yes
Compressed Air	yes[1]

TABLE 2.2-1 (CONTINUED)
Plant Level Scoping Results

SSC	Within Scope of License Renewal?
Condensate	no
Condensate Storage Tank Foundation*	no
Condenser Evacuation	no
Containment (2.4.1)	yes
Containment Electrical Penetrations (2.5.2)	yes
Containment Heating, Ventilation, and Air Conditioning (2.3.3.10)	yes
Containment Penetration, and System Interface Components for Non-CQE Systems (2.3.2.2)*	yes
Control Board (2.5.16)	yes
Control Room Heating, Ventilation, and Air Conditioning (2.3.3.12)	yes
Demineralized Water*	yes[1]
Demineralized Water Sampling*	no
Diverse Scram System (2.5.17)	yes
Duct Banks (2.4.2.7)	yes
Electrical Equipment (2.5.14)*	yes
Emergency Diesel Generators (2.3.3.3)	yes
Emergency Diesel Generator Lube Oil and Fuel Oil (2.3.3.4)	yes
Emergency Diesel Jacket Water (2.3.3.6)	yes
Emergency Lighting (2.5.19)	yes
Engineered Safeguards (2.5.3)	yes
Feedwater (2.3.4.1)	yes
Fire Protection (2.3.3.14)	yes
Fire Protection - Security Building*	no
Fire Protection-Warehouse*	no
Fire Protection Fuel Oil (2.3.3.5)	yes

TABLE 2.2-1 (CONTINUED)
Plant Level Scoping Results

SSC	Within Scope of License Renewal?
Fuel Handling Equipment and Heavy Load Cranes (2.4.2.5)	yes
Gaseous Waste Disposal (2.3.3.18)	yes
Gasoline Storage Tank	no
Generator Seal Oil*	no
Hazardous Waste Storage Building	no
Heater Vents and Drains*	no
Hydrogen Gas	no
Instrument Air (2.3.3.8)	yes
Intake and Turbine Building Sump Pump	no
Intake Structure (2.4.2.3)	yes
Intake Structure HVAC*	no
Liquid Waste Disposal (2.3.3.17)	yes
Main Steam and Turbine Steam Extraction (2.3.4.3)	yes
Maintenance Shop*	no
Meteorological Monitoring*	no
New Warehouse*	no
Nitrogen Gas (2.3.3.9)	yes
Nitrous Oxide Gas*	no
Non-CQE Auxiliary Feedwater Pump Fuel Oil*	no
Nuclear Instrumentation (2.5.4)	yes
Oxygen Gas*	no
Plant Computer and Emergency Response Facility Computer (2.5.11)	yes
Plant Security*	no
Portal Monitor Gas*	no
Post Accident Sampling	no

TABLE 2.2-1 (CONTINUED)
Plant Level Scoping Results

SSC	Within Scope of License Renewal?
Potable Water	no
Primary Sampling (2.3.3.19)	yes
Propane Gas*	no
Qualified Safety Parameter Display (2.5.12)	yes
Rad Waste Building	no
Rad Waste Building HVAC	no
Radiation Monitoring – Mechanical (2.3.3.20) Electrical (2.5.13)	yes
Raw Water (2.3.3.15)	yes
Reactor Coolant (2.3.1.2)	yes
Reactor Protection System (2.5.5)	yes
Reactor Regulating System	no
Reactor Vessel (2.3.1.3)	yes
Reactor Vessel Internals (2.3.1.1)	yes
Safety Injection (HPSI, LPSI, Containment Spray) (2.3.2.1)	yes
Sampling Platform*	no
Sanitary and Storm Drains*	no
Seal Water	no
Secondary Sampling	no
Secondary Side Chemical Feed	no
Security Building*	no
Security Building HVAC*	no
Security Diesel*	no
Security Diesel Fuel Oil*	no
Service Air	no
Solid Waste Disposal	no

TABLE 2.2-1 (CONTINUED)
Plant Level Scoping Results

SSC	Within Scope of License Renewal?
Spent Fuel Pool Cooling (2.3.3.2)	yes
Starting Air (2.3.3.7)	yes
Steam Generator Feedwater Blowdown	no
Substation*	no
Substation Equipment	no
Technical Support Center	no
Technical Support Center HVAC	no
Toxic Gas Monitoring (2.3.3.12)	yes
Transformer Yard	no
Turbine Generator Electro Hydraulic Control*	no
Turbine Generator and Accessories	no
Turbine Generator Lubricating Oil	no
Turbine Building and Service Building (2.4.2.2)	yes
Turbine Building HVAC	no
Turbine Plant Cooling	no
Turbine Supervisory*	no
Vacuum Priming*	no
Vacuum Service (Laboratories)*	no
Ventilating Air (2.3.3.13)*	yes
Vents and Drains	no
Vibration Monitoring	no
Warehouse HVAC	no

[1] The intended function(s) for these systems was limited to containment isolation and/or pressure boundary between CQE and Non-CQE systems. The number of components with intended functions in each of these systems is very small, so to make the process of evaluation and review more efficient the components which have intended functions were transferred to one commodity group for evaluation. That group is titled "Containment Penetration, and System Interface Components for Non-CQE Related Systems." (2.3.2.2)

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL SYSTEMS

The determination of mechanical systems within the scope of license renewal was made by initially identifying Fort Calhoun Station mechanical systems and their design functions. Each system was then reviewed to determine those that satisfy one or more of the criteria contained in 10 CFR 54.4. This process is described in Section 2.1 and the results of the mechanical systems review are included in Section 2.2. Section 2.1 also provides the methodology for determining the components that meet the requirements contained in 10 CFR 54.21(a)(1). The components that meet these screening requirements are identified in this section. These identified components require an aging management review for license renewal.

The results are provided below in four subsections:

- Reactor Coolant Systems (2.3.1)
- Engineered Safety Features Systems (2.3.2)
- Auxiliary Systems (2.3.3)
- Steam and Power Conversion Systems (2.3.4)

2.3.1 REACTOR COOLANT SYSTEMS

Reactor Coolant Systems are those systems designed to contain and support the nuclear fuel, contain the reactor coolant, and transfer the heat produced in the reactor to the steam and power conversion systems for the production of electricity. The following systems are included in this subsection:

- Reactor Vessel Internals (2.3.1.1)
- Reactor Coolant (2.3.1.2)
- Reactor Vessel (2.3.1.3)

2.3.1.1 REACTOR VESSEL INTERNALS

The Reactor Vessel Internals (RVI) were designed to support and align the fuel assemblies, control element assemblies (CEAs), and in-core instrumentation (ICI) assemblies, and to guide reactor coolant through the reactor vessel. The RVI were also designed to absorb the static and dynamic loads and transmit these loads to the reactor vessel flange.

The RVI were designed to safely perform their functions in normal operating, upset, and emergency conditions, and to safely withstand the forces due to deadweight, handling, system pressure, flow impingement, temperature differential, shock, and vibration.

All RVI components are considered Class 1 for seismic design. The design of the RVI limits deflection where such limits are required by function. The stress values of all structural components under normal operating and expected transient conditions are not greater than those established by Section III of the ASME Boiler and Pressure Vessel Code. The effects of neutron embrittlement on materials utilized and accident loadings on the internals have been considered in the design analysis.

The license renewal boundary for the RVI consists of all components internal to the reactor vessel, excluding the reactor vessel and head, the CEDMs, and integral attachments to the reactor vessel and head.

The components of the RVI consist of the following major components and their associated subcomponents:

- Upper Guide Structure (UGS)
- Core Support Barrel (CSB)
- Thermal Shield
- Flow Skirt
- Core Shroud
- CEA Shroud Assemblies
- ICI Support Assemblies
- Lower Support Structure
- Control Element Assemblies (CEA)
- Fuel Assemblies

The main system interfaces for the RVI are the Reactor Coolant System (RCS) and the Reactor Vessel (RV).

RVI figures can be found in the FCS USAR Section 3, Figures 3.1-1, 3.1-2, and 3.7-1.

More information about RVI can be found in USAR Section 3.7.1.

The RVI component types subject to aging management review and their intended functions are shown in Table 2.3.1.1-1.

TABLE 2.3.1.1-1
REACTOR VESSEL INTERNALS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
CEA Shroud Bolts	Structure Functional Support
CSB Snubber Bolts	Structure Functional Support
Thermal Shield Bolts (Positioning Pins) and Core Shroud Bolts	Structure Functional Support
CEA Shroud Spanner Nuts, and ICI Support Bolting	Structure Functional Support
CSB Bolts and Lower Internals Assembly Bolts	Structure Functional Support
CEA Shrouds – Base, Tube, and Transition Piece	Structure Functional Support
CEA Shrouds – Dual Shrouds	Structure Functional Support
CSB, Core Support Ring	Structure Functional Support
CSB Alignment Key and CSB Upper Flange	Structure Functional Support
CSB Nozzle	Flow Distribution
CSB - Spacer, Locking Collar, Dowel Pin, and Locking Bar	Structure Functional Support
CSB Snubber Spacer Block	Structure Functional Support
Core Shroud	Structure Functional Support
Core Shroud – Dowel Pin	Structure Functional Support
Flow Skirt	Flow Distribution
Fuel Assembly Alignment Plate	Structure Functional Support
ICI Guide Tube & Supports	Structure Functional Support
ICI Support Plate & Gusset	Structure Functional Support
Instrument Tube & Supports	Structure Functional Support
Lower Internals Assembly - Manhole Cover Plate & Bottom Plate	Structure Functional Support
Lower Internals Assembly - Core Support Columns	Structure Functional Support

TABLE 2.3.1.1-1 (CONTINUED)
REACTOR VESSEL INTERNALS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Lower Internals Assembly - Core Support Plate and Support Beams and Flanges	Structure Functional Support
Lower Internals Assembly - Anchor Block and Dowel Pins	Structure Functional Support
Thermal Shield	Radiation Shielding
Thermal Shield Support - Pin & Shim	Structure Functional Support
UGS - Ring Shim, Tab, & Plate	Structure Functional Support
UGS - Dowel Pin, Guide Pin, & Locking Strip	Structure Functional Support
UGS - Guide Pin	Structure Functional Support
UGS - Alignment Lug	Structure Functional Support
UGS - Alignment Lug Screw and Nut	Structure Functional Support
UGS - Key Slot Tab	Structure Functional Support
UGS - Hold-down Ring	Structure Functional Support
UGS - Support Plate & Sleeves	Structure Functional Support

2.3.1.2 REACTOR COOLANT

The Reactor Coolant System (RCS) consists of two heat transfer loops connected in parallel to the reactor vessel. Each loop contains one steam generator, two reactor coolant pumps, connecting piping, and instrumentation. A pressurizer is connected to one of the reactor vessel outlet (hot leg) pipes by a surge line. The pressurizer has both power operated relief valves (PORVs) and safety valves, which discharge to the quench tank (Class 4, non-CQE) to condense and cool valve discharges. All components of the RCS are located within the Containment Building.

The RCS is designed to remove heat from the reactor core and internals and transfer it to the secondary (steam generating) system by the controlled circulation of pressurized, borated water that serves both as a coolant and a neutron moderator. The RCS serves as a barrier to the release of radioactive materials to the Containment Building and is equipped with controls and safety features that ensure safe conditions within the system. The design pressure is 2500 psia. The design temperature is 650 deg F (pressurizer-700 deg F).

The RCS pressure is maintained and controlled through the use of the pressurizer, where steam and water are maintained in thermal equilibrium. Steam is formed by energizing immersion heaters in the pressurizer or is condensed by subcooled pressurizer spray, as necessary, to maintain operating pressure and limit pressure variations due to plant load transients. Overpressure protection for the system is provided by two power operated relief valves (PORVs) and two spring loaded ASME Code safety valves. These valves discharge to the quench tank where the steam is released under water to be condensed and cooled. If the steam discharge exceeds the capacity of the tank, the tank is relieved to the containment atmosphere.

The RCS boundary includes all the components on the RCS P&IDs except the reactor vessel and head. The main RCS components include the reactor coolant pumps and motors, reactor coolant piping, pressurizer, pressurizer heaters, PORVs and safety valves, steam generators, and associated instrumentation and controls.

The steam generator boundaries are set at the ends of the nozzles connecting the steam generators to other components or systems. The nozzles include main feedwater, auxiliary feedwater, steam, RCS inlet and outlet, and instrumentation. The nozzles and integral attachments are considered part of each steam generator.

The major system interfaces with the RCS are the CVCS (Chemical and Volume Control System), Safety Injection, Reactor Protection, Reactor Regulating, the ESFAS (Engineered Safety Features Actuation System), and the Reactor Vessel.

NUREG-1801, item IV.C2.6-a discusses the pressurizer relief tank. The analogous FCS component, the quench tank, is not within the scope of license renewal at FCS, as it has no intended function. A similar scoping determination for a Combustion Engineering plant was evaluated by the staff as documented in Reference 2.3-1 as follows: "The quench tanks for CCNPP Units 1 and 2 were not in the scope of license renewal because these non-safety-related components did not serve an intended function. The staff reviewed the information and agrees with the applicant's conclusion."

The pressurizer spray head listed in NUREG-1801, Item IV.C2.5-d is not within the scope of license renewal at FCS, as it has no intended function. A similar scoping determination for a Combustion Engineering plant was evaluted by the staff as documented in Reference 2.3-1 as follows:

> The applicant further stated that the spray head and its spray function is not credited for the mitigation of any accidents addressed in the UFSAR Chapter 14 accident analyses and therefore does not meet the scoping requirements of 10 CFR 54.4(a)(1). The function of the pressurizer spray is to reduce RCS pressure under normal operating conditions. Also, its failure would not prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1). On the basis of this clarification, the staff agrees with the applicant's conclusion that the spray head need not be within the scope of license renewal.

NUREG-1800, Table 2.3-1 includes a pressurizer spray head with no intended functions as an example of a component not within the scope of license renewal.

The Reactor Coolant System boundaries are highlighted on the following drawings:

- D-23866-210-111, Sheet 1, Reactor Coolant Pump RC-3A P&ID
- D-23866-210-111, Sheet 2, Reactor Coolant Pump RC-3B P&ID
- D-23866-210-111, Sheet 3, Reactor Coolant Pump RC-3C P&ID
- D-23866-210-111, Sheet 4, Reactor Coolant Pump RC-3D P&ID
- D-4078, Reactor Coolant Gas Vent System P&ID
- E-23866-210-110, Sheet 1, Reactor Coolant System Flow Diagram P&ID
- E-23866-210-110, Sheet 1A, Reactor Coolant System Flow Diagram P&ID
- E-23866-210-120, Sheet 1A, Chemical and Volume Control System P&ID
- E-23866-210-130, Sheet 2A, Safety Injection and Containment Spray System Flow Diagram P&ID
- 11405-M-12, Sheet 1, Primary Plant Sampling System Flow Diagram P&ID

More information about the Reactor Coolant System can be found in USAR Section 4.

The Reactor Coolant component types subject to aging management review and their intended functions are shown in Table 2.3.1.2-1.

TABLE 2.3.1.2-1
REACTOR COOLANT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary/Fission Product Retention
Flow Element/ Orifice	Pressure Boundary/ Fission Product Retention
FW Nozzle Safe Ends	Pressure Boundary/ Fission Product Retention
Pressurizer & SG Nozzle Welds	Pressure Boundary/ Fission Product Retention
Pressurizer Bottom Plate (Cladding)	Pressure Boundary/ Fission Product Retention
Pressurizer Heater Sleeves	Pressure Boundary/ Fission Product Retention
Pressurizer Heater Support Assembly	Component Structural Support
Pressurizer Manway	Pressure Boundary/ Fission Product Retention
Pressurizer RV Nozzle Insert and Pressurizer Upper and Lower Level Nozzle Inserts	Pressure Boundary/ Fission Product Retention
Pressurizer Relief Valve and Upper & Lower Level Nozzles	Pressure Boundary/ Fission Product Retention
Pressurizer RV, Spray, Surge, SV, and Upper & Lower Level Nozzle Welds	Pressure Boundary/ Fission Product Retention
Pressurizer RV, Spray, Surge, Temperature, and Upper & Lower Level Nozzle Safe Ends	Pressure Boundary/ Fission Product Retention
Pressurizer Shell and Plates	Pressure Boundary/ Fission Product Retention
Pressurizer Shell and Top Head Plate (Cladding)	Pressure Boundary/ Fission Product Retention
Pressurizer Spray and Surge Nozzle Thermal Sleeves	Fatigue Prevention
Pressurizer Spray, Surge, and Safety Valve Nozzles (Base)	Pressure Boundary/ Fission Product Retention

TABLE 2.3.1.2-1 (CONTINUED)
REACTOR COOLANT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Pressurizer Spray, Surge, and Safety Valve Nozzles – (Cladding)	Pressure Boundary/ Fission Product Retention
Pressurizer Support Assembly	Component Structural Support
Pressurizer Safety Valve Nozzle Flange and Temperature Nozzle	Pressure Boundary/ Fission Product Retention
Pressurizer Temperature Nozzle and Safety Valve Nozzle Flange	Pressure Boundary/ Fission Product Retention
Pressurizer Vessel Welds	Pressure Boundary/ Fission Product Retention
Pressurizer Welds	Pressure Boundary/ Fission Product Retention
Primary and Secondary Manways/ Handholes	Pressure Boundary/ Fission Product Retention
RC Hot & Cold Leg Piping	Pressure Boundary/ Fission Product Retention
RC Piping Charging, Drain, Pressure Measurement, Pressure Measurement & Sampling, Shutdown Cooling Inlet and Outlet, Spray, and Surge Nozzles	Pressure Boundary/ Fission Product Retention
RC Piping Charging, SDC Inlet, and Surge Nozzle Thermal Sleeves	Pressure Boundary/ Fission Product Retention
RC Piping Nozzle Thermal Sleeves (Charging, SDC Inlet and Surge)	Pressure Boundary/ Fission Product Retention
RC Piping Nozzles (Charging, Drain, Pressure Measurement, Pressure Measurement and Sampling, SDC Inlet, SDC Outlet, Spray, Surge)	Pressure Boundary/ Fission Product Retention
RC Piping Thermowells and Stainless Steel Welds (All NPS)	Pressure Boundary/ Fission Product Retention
RC Piping Welds (A182/82)	Pressure Boundary/ Fission Product Retention
RC Piping Welds (Stainless Steel)	Pressure Boundary/ Fission Product Retention

TABLE 2.3.1.2-1 (CONTINUED)
REACTOR COOLANT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
RC RCGVS, PZR Spray, CVCS, and PORV Line Piping (ALL NPS)	Pressure Boundary/ Fission Product Retention
RC Surge Line Piping	Pressure Boundary/ Fission Product Retention
RCP Driver Mounts	Pressure Boundary/ Fission Product Retention
RCP Pump Cover (Thermal Barrier)	Pressure Boundary/ Fission Product Retention
RCP Seal Cover and Bleed-off Flange	Pressure Boundary/ Fission Product Retention
RCP Seal Water Cooler Tubes	Pressure Boundary/ Fission Product Retention
RCP Pressure Breakdown Devices	Pressure Boundary/ Fission Product Retention
Reactor Coolant Pump Casing	Pressure Boundary/ Fission Product Retention
Steam Generator Blowdown Nozzles	Pressure Boundary
Steam Generator FW Nozzle Safe End	Pressure Boundary
Steam Generator FW, Primary, Instrument, and Steam Nozzles	Pressure Boundary
Steam Generator Nozzle Welds	Pressure Boundary
Steam Generator Primary Head (Base)	Pressure Boundary
Steam Generator Primary Head (Cladding)	Pressure Boundary/ Fission Product Retention
Steam Generator Primary Manways (Cladding)	Pressure Boundary/ Fission Product Retention
Steam Generator Primary Nozzle (Cladding)	Pressure Boundary/ Fission Product Retention
Steam Generator Primary Nozzle Safe End	Pressure Boundary/ Fission Product Retention

TABLE 2.3.1.2-1 (CONTINUED)
REACTOR COOLANT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Steam Generator Secondary Head, Shell, and Transition Cone	Pressure Boundary
Steam Generator Secondary Manways and Handholes	Pressure Boundary
Steam Generator Steam Nozzle Safe End	Pressure Boundary
Steam Generator Tube Plugs	Pressure Boundary/ Fission Product Retention
Steam Generator Tube Sheet (Primary Side)	Pressure Boundary/ Fission Product Retention
Steam Generator Tube Sheet (Secondary Side)	Pressure Boundary/ Fission Product Retention
Steam Generator Tube Supports	Structure Functional Support
Steam Generator Blowdown Nozzles	Pressure Boundary
Steam Generator Tubes	Heat Transfer Pressure Boundary/ Fission Product Retention
Valve Bodies	Pressure Boundary/ Fission Product Retention

2.3.1.3 REACTOR VESSEL

The Reactor Vessel (RV) is a 140-inch beltline inner diameter two-loop vessel. This configuration has four coolant inlet nozzles and two coolant outlet nozzles. The vessel is comprised of a removable head with multiple penetrations (control element drive mechanisms, in-core instrumentation nozzles, and the reactor vessel vent line), upper, intermediate and lower shell courses, bottom head and vessel supports. The vessel includes two leakage detection lines that are located between the vessel flange o-rings. The vessel is an all welded, manganese molybdenum-nickel steel plate and forging construction. Welds were made with submerged arc welding processes using Mn-Mo-Ni steel consumable wire, a Linde welding flux, and shield metal arc repair welds. The interior surfaces of the vessel in contact with reactor coolant are clad with austenitic stainless steel.

The major system interfaces with the RV are the Reactor Coolant System and the Reactor Vessel Internals.

The Reactor Vessel boundaries are highlighted on the following drawings:

- E-232-408, Rev. 5, General Arrangement, Elevation, for Omaha Power 140" I.D. PWR
- E-23866-163-007, Rev. 9, C.E.D.M. Installation Drawing
- E-23866-165-026, Rev. 2, In-Core Instrument Flanges Interface

More information about the Reactor Vessel can be found in USAR Section 4.

The list of Reactor Vessel component types subject to aging management review and their intended functions are shown in Table 2.3.1.3-1.

TABLE 2.3.1.3-1
REACTOR VESSEL
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Closure Studs and ICI Studs	Pressure Boundary/Fission Product Retention
CEDM Nozzles	Pressure Boundary/Fission Product Retention
Core Stabilizing Lugs	Limit Vibration
Core Support Lugs	Core Displacement
ICI Nozzles	Pressure Boundary/Fission Product Retention
Keyways	Structural Support
Pipes & Fittings	Pressure Boundary/Fission Product Retention
Primary Nozzle Supports	Structural Support
RV Closure Head Lift Rig Pads	Structural Support
RV Closure Head, RV Lower Shell, RV Middle Shell, RV Bottom Head, RV Flange	Pressure Boundary/Fission Product Retention
RV Nozzle Safe Ends	Pressure Boundary/Fission Product Retention
RV Nozzles	Pressure Boundary/Fission Product Retention
Surveillance Capsule Holders	Non-Safety Affecting Safety

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

Engineered Safety Features Systems consist of systems and components designed to function under accident condition to minimize the severity of an accident or to mitigate the consequences of an accident. In the event of a loss-of-coolant accident, the Engineered Safety Features Systems provide emergency coolant to assure structural integrity of the core, to maintain the integrity of the containment, and to reduce the concentration of fission products expelled to the containment building atmosphere. The following systems are included in this subsection:

- Safety Injection and Containment Spray (2.3.2.1)
- Containment Penetration, and System Interface Components for Non-CQE Systems (2.3.2.2)

2.3.2.1 SAFETY INJECTION AND CONTAINMENT SPRAY

The Safety Injection (SI) system injects borated water into the Reactor Coolant System to provide emergency core cooling following a loss of coolant accident (LOCA). This provides core cooling to ensure there is no significant alteration of core geometry, no clad melting, no fuel melting, and less than 1 percent cladding water reaction. This also limits fission product release and ensures adequate shutdown margin regardless of temperature. The SI system also provides continuous long term post-accident cooling of the core by recirculation of borated water from the containment recirculation line inlet located in the containment sump.

The major components of the SI system are the three high pressure safety injection (HPSI) pumps, two low pressure safety injection (LPSI) pumps, four safety-injection tanks, four safety-injection leakage coolers, eight HPSI control valves, four LPSI control valves and other various valves, instrumentation, and piping.

During normal plant operation the SI system is maintained in a standby mode with all of its components lined up for emergency injection. In standby mode, none of the major system components are operating. Following an incident that results in a safety injection actuation signal (SIAS), the HPSI and LPSI pumps automatically start and the high pressure and low pressure injection valves automatically open.

During the injection mode of operation, the HPSI and LPSI pumps take suction from the Safety Injection and Refueling Water Tank (SIRWT) (the SIRWT is addressed in Section 2.4.2, Auxiliary Building) and inject borated water into the Reactor Coolant System (RCS) via the safety injection nozzles located on the RCS cold legs.

The four safety injection tanks constitute a passive injection system since no electrical signal, operator action or outside power source is required for the tanks to function. The tanks are designed to inject large quantities of borated water to cover the core in the event of a rapid depressurization of the RCS due to a large break LOCA.

The function of the Containment Spray (CS) system is to limit the containment structure pressure rise by providing a means for cooling the containment atmosphere after the occurrence of a LOCA. Pressure reduction is accomplished by spraying cool, borated water into the containment atmosphere. Heat removal is accomplished by recirculating and cooling the water through the shutdown cooling heat exchangers. The CS System also reduces the leakage of airborne radioactivity by effectively removing radioactive particulates from the containment atmosphere. Removal of radioactive particulates is accomplished by spraying water into the containment atmosphere. The particulates become attached to the water droplets, which fall to the floor and are washed into the containment sump.

The CS system consists of three spray pumps, two heat exchangers (shutdown cooling heat exchangers) and all necessary piping, valves, instruments, and accessories. The pumps discharge the borated water through the two heat exchangers, during recirculation, to a dual set of spray headers and spray nozzles in the containment. These spray headers are supported from the containment roof and are arranged to give essentially complete spray coverage of the containment horizontal cross section area.

The Safety Injection and Containment Spray system boundaries are highlighted on the following P&ID drawings:

- E-23866-210-130, Sheet 1, Rev. 80, Safety Injection and Containment Spray System
- E-23866-210-130, Sheet 2, Rev. 57, Safety Injection and Containment Spray System
- E-23866-210-130, Sheet 2A, Rev. 8, Safety Injection and Containment Spray System
- E-23866-210-130, Sheet 2B, Rev. 7, Safety Injection and Containment Spray System
- E-23866-210-130, Sheet 3, Rev. 11, Safety Injection and Containment Spray System
- D-23866-210-111, Sheet 1, Rev. 43, Reactor Coolant Pump RC-3A
- D-23866-210-111, Sheet 2, Rev. 18, Reactor Coolant Pump RC-3B
- D-23866-210-111, Sheet 3, Rev. 19, Reactor Coolant Pump RC-3C
- D-23866-210-111, Sheet 4, Rev. 19, Reactor Coolant Pump RC-3D
- E-23866-210-120, Sheet 1, Rev. 66, Chemical and Volume Control System
- E-23866-210-120, Sheet 2, Rev. 11, Chemical and Volume Control System
- 11405-M-5, Sheet 2, Rev. 17, Demineralized Water System
- 11405-M-6, Sheet 2, Rev. 18, Waste Disposal System
- 11405-M-11, Rev. 48, Auxiliary Coolant – Spent Fuel Pool Cooling
- 11405-M-12, Sheet 1, Rev. 60, Primary Plant Sampling System

More information about Safety Injection and Containment Spray can be found in USAR Section 6.2 and USAR Section 6.3, respectively.

The Safety Injection and Containment Spray component types subject to aging management review and their intended functions are shown in Table 2.3.2.1-1.

TABLE 2.3.2.1-1
SAFETY INJECTION AND CONTAINMENT SPRAY
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Accumulators	Pressure Boundary/Fission Product Retention
Bolting	Pressure Boundary/Fission Product Retention
Filter/strainer	Filtration Pressure Boundary/Fission Product Retention
Flow Element/orifice	Pressure Boundary/Fission Product Retention
Heat Exchanger	Pressure Boundary/Fission Product Retention
Orifice Plate	Flow Restriction Pressure Boundary/Fission Product Retention
Pipes & Fittings	Pressure Boundary/Fission Product Retention
Pump Casings	Pressure Boundary/Fission Product Retention
Tanks	Pressure Boundary/Fission Product Retention
Tubing	Pressure Boundary/Fission Product Retention
Valve Bodies	Pressure Boundary/Fission Product Retention

2.3.2.2 CONTAINMENT PENETRATION, AND SYSTEM INTERFACE COMPONENTS FOR NON-CQE SYSTEMS

The Containment Penetration, and System Interface Components for Non-CQE Systems Group includes the containment isolation valves of the Feedwater Blowdown, Compressed Air, Blowpipe, and Demineralized Water Systems as well as the piping between the containment penetrations and the containment isolation valves. The CQE heat exchangers in the Demineralized Water System are included to maintain the Component Cooling Water system pressure boundary.

The mechanical portions of all electrical penetrations that provide containment isolation are also included.

The Containment Penetrations, and System Interface Components Group boundaries are highlighted on the following drawings:

- 11405-M-5 Sheet 1, Demineralized Water System Flow Diagram P&ID
- 11405-M-5 Sheet 2, Demineralized Water System Flow Diagram P&ID
- 11405-M-13, Plant Air System Flow Diagram P&ID
- 11405-M-253, Sheet 1, Flow Diagram Steam Generator Feedwater and Blowdown P&ID

The Containment Penetrations and System Interface component types subject to aging management review and their intended functions are shown in Table 2.3.2.2-1.

TABLE 2.3.2.2-1
CONTAINMENT PENETRATIONS, AND SYSTEM INTERFACE
Component Types Subject to Aging Management
Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Heat Exchanger	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Primary Containment Penetrations	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3 AUXILIARY SYSTEMS

Auxiliary Systems are those systems used to support normal and emergency plant operations. The systems provide cooling, ventilation, sampling, and other required functions. The following systems are included in this subsection.

- Chemical and Volume Control (2.3.3.1)
- Spent Fuel Pool Cooling (2.3.3.2)
- Emergency Diesel Generators (2.3.3.3)
- Diesel Generator Lube Oil and Fuel (2.3.3.4)
- Auxiliary Boiler Fuel Oil and Fire Protection Fuel Oil (2.3.3.5)
- Diesel Jacket Water (2.3.3.6)
- Diesel Starting Air (2.3.3.7)
- Instrument Air (2.3.3.8)
- Nitrogen Gas (2.3.3.9)
- Containment Ventilation (2.3.3.10)
- Auxiliary Building Ventilation (2.3.3.11)
- Control Room HVAC and Toxic Gas Monitoring (2.3.3.12)
- Ventilating Air (2.3.3.13)
- Fire Protection (2.3.3.14)
- Raw Water (2.3.3.15)
- Component Cooling (2.3.3.16)
- Liquid Waste Disposal (2.3.3.17)
- Gaseous Waste Disposal (2.3.3.18)
- Primary Sampling (2.3.3.19)
- Radiation Monitoring – Mechanical (2.3.3.20)

2.3.3.1 CHEMICAL AND VOLUME CONTROL

The Chemical and Volume Control System (CVCS) maintains desired water level, water chemistry/purity, and boron concentration in the reactor coolant through continuous feed-and-bleed operation. The CVCS includes one regenerative heat exchanger, one letdown heat exchanger, five ion exchangers, two purification filters, one volume control tank, three positive-displacement charging pumps, one boric acid batching tank, two boric acid storage tanks, two centrifugal boric acid transfer pumps, one chemical additional tank with metering pump, piping, valves, instrumentation, and controls.

The Chemical and Volume Control System mechanical boundaries are highlighted on the following drawings:

- E-23866-210-120, Sheet 1, Chemical and Volume Control System P&ID
- E-23866-210-120, Sheet 1A, Chemical and Volume Control System P&ID
- E-23866-210-120, Sheet 2A, Chemical and Volume Control System P&ID
- E-23866-210-120, Sheet 2B, Chemical and Volume Control System P&ID
- E-23866-210-121, Sheet 1, Chemical and Volume Control System P&ID

- E-23866-210-121, Sheet 2, Chemical and Volume Control System P&ID
- 11405-M-42, Sheet 1, Nitrogen, Hydrogen, Methane, Propane and Oxygen Gas Flow Diagram P&ID

More information about the Chemical and Volume Control System can be found in USAR Section 9.2.

The Chemical and Volume Control System component types subject to aging management review and their intended functions are shown in Table 2.3.3.1-1.

TABLE 2.3.3.1-1
CHEMICAL AND VOLUME CONTROL SYSTEM
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filter/strainer Housing	Pressure Boundary
Flow Element/orifice	Pressure Boundary
Heat Exchanger	Pressure Boundary
Ion Exchangers	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Tubing	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.2 SPENT FUEL POOL COOLING

The Spent Fuel Pool Cooling System consists of a stainless steel lined storage pool, two storage pool circulation pumps, a storage pool heat exchanger, a demineralizer and filter, two fuel transfer canal drain pumps, piping, manual valves and instrumentation. The pool concrete and liner are evaluated with the Auxiliary Building (application Section 2.4.2.1).

The storage pool pumps circulate borated water through the storage pool heat exchanger and return it to the pool. Cooling water to the heat exchanger is provided by the Component Cooling Water System. The purity and clarity is maintained by diverting a portion of the circulated water through the demineralizer and the filter. The fuel transfer canal drain pumps are used to provide pool make-up water from the Safety Injection and Refueling Water Tank (SIRWT) and also to drain the fuel transfer canal and return the refueling water to the SIRWT or the Radioactive Waste Disposal System.

The Spent Fuel Pool Cooling System boundaries are highlighted on the following drawings:

- 11405-M-11, Revision 48, Auxiliary Coolant Spent Fuel Pool Cooling System Flow Diagram P&ID
- 11405-M-6, Sheet 2, Revision 19, Waste Disposal System Flow Diagram P&ID

More information about the Spent Fuel Pool Cooling System can be found in USAR Section 9.6.

The Spent Fuel Pool Cooling System component types subject to aging management review and their intended functions are shown in Table 2.3.3.2-1.

TABLE 2.3.3.2-1
SPENT FUEL POOL COOLING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filter/strainer Housing	Pressure Boundary
Heat Exchanger	Heat Transfer; Pressure Boundary
Ion Exchangers	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.3 EMERGENCY DIESEL GENERATORS

The Emergency Diesel Generators, DG-1 and DG-2, are designed to furnish reliable in-plant AC power adequate for safe plant shutdown, and for operation of Engineered Safeguards, when no energy is available from the 345kV or 161kV systems. For adequate reliability two units are provided. Each unit is connected to one of the two separate 4160V systems between which Engineered Safeguards and other essential auxiliaries are divided. The division of loads is such that operation of either system alone provides the minimum Engineered Safeguards requirement.

Each emergency diesel generator is provided with an exhaust silencer, an engine control panel, an exciter, an electrical panel and auxiliaries. Each emergency diesel generator interfaces with an integral cooling system, two starting-air systems, a lubricating system, two fuel systems between the engine mounted fuel oil tanks, and the engine fuel lines. Both emergency diesel generators are supplied fuel from a common, underground fuel oil storage tank by redundant transfer pumps. No external energy source other than 125V DC control power is required for starting or subsequent operation of the emergency diesel generators.

Immersion heaters are provided to maintain engine jacket water and lubricating oil temperatures at desirable temperatures for quick, reliable starting. The emergency diesel generators are located in separate rooms of the Auxiliary Building.

10 CFR 54 recognizes that the diesel generators are active and excludes them from the group of equipment that is subject to AMR [10 CFR 54.21(a)(1)(l)]. The auxiliary subsystems for the Emergency Diesel Generators (EDGs) are treated as separate systems from the EDG (i.e., EDG jacket water, EDG fuel and lube oil and EDG starting air). The auxiliary subsystems stop at the connection to the engine skid. The components on the engine side of the auxiliary subsystem connection are considered part of the diesel generators for the purposes of license renewal.

The Emergency Diesel Generator System boundaries are highlighted on the following drawing:

- E-4183, Rev. 1 Diesel Generator Intake Air & Exhaust Diagram

More information about Emergency Diesel Generators can be found in USAR Section 8.4.1.

The Emergency Diesel Generator component types subject to aging management review and their intended functions are shown in Table 2.3.3.3-1.

TABLE 2.3.3.3-1
EMERGENCY DIESEL GENERATORS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary / structural integrity
Pipes & Fittings	Provides an exhaust path for diesel generators

2.3.3.4 EMERGENCY DIESEL GENERATOR LUBE OIL AND FUEL OIL

The Emergency Diesel Generator Lube Oil System lubricates the diesel engine components and filters and cools the engine lube oil. The lube oil system supports operation of the emergency diesel generators which provide a reliable source of 4160 VAC power for safe plant shutdown and operation of engineered safeguards when the normal sources of offsite power are lost.

The Emergency Diesel Generator Fuel Oil System provides fuel to the engine in the proper amount to maintain engine speed and load. The fuel oil system supports operation of the emergency diesel generators which provide a reliable source of 4160 VAC power for safe plant shutdown and operation of engineered safeguards when the normal sources of offsite power are lost. An 18,000 gallon underground storage tank serves both engines. This tank can be replenished from the auxiliary boiler fuel oil storage tank if necessary. Two transfer pumps for each diesel transfer fuel from the underground storage tank to a wall-mounted auxiliary tank. Fuel gravity drains from the wall-mounted tank to the engine base tank. One engine driven fuel oil pump and one motor driven fuel oil pump deliver fuel to the engine fuel injectors.

The Emergency Diesel Generator Lube Oil and Fuel Oil System boundaries are highlighted on the following drawings:

- 11405-M-262, Sheet 1, Fuel Oil Flow Diagram
- B120F03001, Sheet 1, Lube Oil System Schematic for DG-1
- B120F03001, Sheet 2, Lube Oil System Schematic for DG-2

More information about the Emergency Diesel Generator Lube Oil and Fuel Oil System can be found in USAR Section 8.4.1.

The Emergency Diesel Generator Lube Oil and Fuel Oil System component types subject to aging management review and their intended functions are shown in Table 2.3.3.4-1.

TABLE 2.3.3.4-1
EMERGENCY DIESEL GENERATOR LUBE OIL AND FUEL OIL
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Flow Element/orifice	Pressure Boundary
Heat Exchanger	Heat Transfer Pressure Boundary
Hose	Pressure Boundary
Hose Coupling	Pressure Boundary
Indicator/recorder (sightglass)	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Tubing	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.5 AUXILIARY BOILER FUEL OIL AND FIRE PROTECTION FUEL OIL

The Fire Protection Fuel Oil (FP-FO) System supplies fuel oil to the diesel engine fire pump. The pump is located at the north end of the Intake Structure and takes its suction from a chamber, immediately inside the traveling screens. The fire pump's diesel engine is independent of site power. A ten-gallon fuel oil day tank for the diesel engine is located adjacent to the engine. Fuel oil is transferred from the diesel fire pump fuel oil tank to the day tank. The 550-gallon capacity diesel fire pump fuel oil tank is located outside the Intake Structure and is contained within an enclosure.

The license renewal boundary of the FP-FO System includes the diesel fire pump fuel oil tank; the priming tank and its hand pump; the fuel oil day tank; the fuel transfer pump; and the filter, valves and piping between the diesel fire pump fuel oil tank and the injector unit of the fire pump diesel engine.

The FP-FO System boundaries are highlighted on the following drawing:

- 11405-M-262, Sheet 3, Fuel Oil System FP and Security Diesels P&ID

The Auxiliary Boiler Fuel Oil (AB-FO) System stores and delivers diesel fuel oil for operation of the plant auxiliary boiler. The auxiliary boiler fuel oil storage tank also stores fuel oil for the emergency diesel generators. The system consists of an 18,000-gallon underground fuel storage tank, two fuel transfer pumps, piping, valves and instrumentation for delivery of fuel oil to the auxiliary boiler. In addition, the license renewal boundary consists of a fuel oil transfer pump, piping, filters, instrumentation and warehoused equipment for delivery of fuel oil from the auxiliary boiler fuel oil storage tank to the diesel engine fuel oil storage tank.

The AB-FO System license renewal boundary includes the auxiliary boiler fuel oil storage tank; below grade piping associated with the tank; the filters, the pumps, valves and piping between the auxiliary boiler fuel oil storage tank and the auxiliary boiler fuel oil supply solenoid valve. In addition, the pump, the filters, and valves within the supply pipeline from the auxiliary boiler fuel oil storage tank through the fuel oil transfer pump discharge valve are included.

The AB-FO System boundary is highlighted on the following drawing:

- 11405-M-262, Sheet 1, Fuel Oil Flow Diagram P&ID

The Fuel Oil For Fire Protection Pump and Auxiliary Boiler component types subject to aging management review and their intended functions are shown in Table 2.3.3.5-1.

TABLE 2.3.3.5-1
AUXILIARY BOILER FUEL OIL AND FIRE PROTECTION FUEL OIL
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Hose	Pressure Boundary
Hose Coupling	Pressure Boundary
Indicator/recorder (sightglass)	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Tubing	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.6 EMERGENCY DIESEL JACKET WATER

The Emergency Diesel Generator Jacket Water System for each emergency diesel generator provides cooling to the engine in order to ensure the diesel rated load can be maintained. Each jacket water system supports operation of an emergency diesel generator which provides a reliable source of 4160V power for safe plant shutdown and operation of engineered safeguards when the normal sources of offsite power are lost. Each engine has its own self-contained radiator type cooling system.

The Emergency Diesel Jacket Water System boundaries are highlighted on the following drawings:

- B120F04002, Sheet 1, Jacket Water Schematic for DG-1
- B120F04002, Sheet 2, Jacket Water Schematic for DG-2

More information about the Emergency Diesel Generator Jacket Water System can be found in USAR Section 8.4.1.

The Emergency Diesel Generator Jacket Water System component types subject to aging management review and their intended functions are shown in Table 2.3.3.6-1.

TABLE 2.3.3.6-1
EMERGENCY DIESEL GENERATOR JACKET WATER
Component Types Subject to Aging Management
Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Electric Heaters	Pressure Boundary
Heat Exchangers (radiators)	Pressure Boundary Heat Transfer
Indicator/recorder (sightglass)	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.7 STARTING AIR

The Starting Air System provides stored pressurized air for starting the emergency diesel generators. Each diesel is provided with a system that contains redundant air storage, piping, air start motors and compressors for charging the storage tanks. Each tank has the capacity for five starts of the diesel (combining for a total of ten emergency starts). Because ten starts is the design basis requirement, those portions of the system used for charging the storage tanks are Non-CQE and are not required for the diesels to meet the design basis. Therefore, the compressors and associated equipment are not included in the license renewal scope.

More information about the Starting Air System can be found in USAR Section 8.4.1.

The Starting Air System boundaries are highlighted on the following drawings:

- B120F07001, Sheet 1, Starting Air System Schematic DG-1
- B120F07001, Sheet 2, Starting Air System Schematic DG-2

The Starting Air System component types subject to aging management review and their intended functions are shown in Table 2.3.3.7-1.

TABLE 2.3.3.7-1
STARTING AIR
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Heat Exchangers	Heat Transfer Pressure Boundary
Lubricator Body	Pressure Boundary
Motor Casings	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.8 INSTRUMENT AIR

The Instrument Air System provides oil-free, filtered and dried air for pneumatic controls, instrumentation, and the actuation of valves, dampers and similar devices. The Instrument Air System is considered to be that equipment required to store and deliver air to pneumatic instruments, controls, valves, and dampers.

The Compressed Air System supplies compressed air to and interfaces with the Instrument Air System at the instrument air distribution system downstream of the after-filter sets. Instrument air is distributed to the various pneumatic components it serves through a network of supply headers and distribution risers. The Instrument Air System also feeds the suction of the compressors for the Starting Air System. (Starting Air is evaluated as a separate system in Section 2.3.3.7)

Backup accumulators containing instrument air or nitrogen are provided on selected pneumatic devices to ensure their operability if instrument air pressure drops.

Drawing 11405-M-264, Sheet 1, Instrument Air Diagram Auxiliary Building and Containment P&ID, shows the license renewal boundary for the system penetration into the containment building. The remainder of the Instrument Air components in scope for license renewal are associated with air-operated valves (AOVs). The instrument air piping and components for the individual valves are not shown on P&IDs. Typical Instrument Air supply configurations for AOVs are shown on drawing C-4175 Sheet 1; Typical Control Valve Air Source Valve Configurations P&ID. The styles shown on that drawing cover the bulk of AOV-related items which are in-scope for license renewal. The boundary flags on that drawing illustrate where the typical license renewal boundaries are for AOV-related items. There are several non-AOV-related pneumatic items in scope for license renewal, but the license renewal boundary locations for those items are generally similar to those for AOVs.

More information about Instrument Air can be found in USAR Section 9.12.

The Instrument Air System component types subject to aging management review and their intended functions are shown in Table 2.3.3.8-1.

TABLE 2.3.3.8-1
INSTRUMENT AIR
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Accumulators	Pressure Boundary
Bolting	Pressure Boundary
Filter Housing	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Tubing	Pressure Boundary
Valve Body	Pressure Boundary
Valve Operator Bodies	Pressure Boundary

2.3.3.9 NITROGEN GAS

The Nitrogen Gas (NG) System is used to charge the safety injection tanks to provide the passive motive force to discharge the contents of the safety injection tanks to re-flood the reactor during an unexpected depressurization of the Reactor Coolant System. It also provides a continuous nitrogen gas supply to various contained areas or vessels within the plant for the control of oxygen to minimize general corrosion. The NG system consists of valves, piping, instruments, and controls.

Nitrogen gas is also used for multiple valves in the plant as a backup to Instrument Air. The NG System components that provide that backup are covered in the Instrument Air results, which are covered in Section 2.3.3.8 of the application.

The NG System boundaries are highlighted on the following P&ID drawings:

- 11405-M-254, Sheet 2, Rev. 27, Flow Diagram Condensate
- 11405-M-42, Sheet 1, Rev. 83, Nitrogen, Hydrogen, Methane, Propane and Oxygen Gas
- E-23866-210-130, Sheet 2, Rev. 57, Safety Injection and Containment Spray System
- E-23866-210-130, Sheet 2B, Rev. 7, Safety Injection and Containment Spray System

The Nitrogen Gas System component types subject to aging management review and their intended functions are shown in Table 2.3.3.9-1.

TABLE 2.3.3.9-1
NITROGEN GAS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.10 CONTAINMENT HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

The Containment Ventilation System provides ventilation and cooling of the containment. The Containment Ventilation System consists of four separate sub-systems. These sub-systems are: (1) containment air re-circulating, cooling,(2) nuclear detector well cooling, (3) containment purge, and (4) hydrogen purge. In the context of Engineering Safeguards, during a design basis event the containment ventilation system removes heat released to the containment atmosphere, restricts leakage of airborne activity from containment, reduces fission product inventory in the containment atmosphere, controls the concentration of hydrogen and provides measurement of specific containment parameters such as pressure and temperature. During normal plant operations, the Containment Ventilation System also maintains the concrete temperature in the biological shield surrounding the reactor vessel.

The Containment HVAC System boundaries are highlighted on the following P&ID drawings:

- 11405-M-1, sheet 1, Rev. 72, Containment Heating, Cooling, & Ventilation
- 11405-M-1, Sheet 2, Rev.25, Containment Heating, Cooling, & Ventilation

More information about Containment HVAC System can be found in USAR Section 9.10.

The Containment HVAC component types subject to aging management review and their intended functions are shown in Table 2.3.3.10-1.

TABLE 2.3.3.10-1
CONTAINMENT VENTILATION
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Blowers & Fan Housing	Pressure Boundary
Bolting	Pressure Boundary
Filter Housing	Pressure Boundary
Duct	Pressure Boundary
Dampers	Pressure Boundary
Heat Exchangers	Heat Transfer
Valve Bodies	Pressure Boundary/Fission Product Retention

2.3.3.11 AUXILIARY BUILDING HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

The Auxiliary Building is ventilated and cooled with ambient outside air. It is divided into two zoned systems for ventilation purposes. These are in the controlled access area and the uncontrolled access area. Both systems are of the once-through, non-recirculating type using supply and exhaust fans. Portions of the Auxiliary Building ventilation system are utilized by the hydrogen purge system, which is an Engineered Safety Features System and is part of the plant's engineered safeguards.

CONTROLLED ACCESS AREA SYSTEM:

The controlled access area ventilation supply system consists of an air handling unit, containing roughing filters and preheat and reheat steam coil banks, two 50% capacity vane axial fans and distribution ductwork. The exhaust system consists of three 33-1/3 percent capacity vane axial fans drawing air through return ducts from each ventilated space to a common filtering unit containing high efficiency particulate air (HEPA) filters. The exhaust air is continuously monitored for radioactive contamination at the ventilation discharge duct before discharge to the atmosphere.

Charcoal filters are installed in normally bypassed ducts at the exhaust of the safety injection and spray pump rooms and the spent regenerate tank room. These filters can be remotely-manually aligned in the event of an accidental release of activity in these rooms (See USAR Section 9.10-1).

A charcoal filter is also installed in a normally bypassed section of the return ductwork drawing air from the spent fuel storage pool area. A differential pressure gauge is installed across each filter to provide a means of determining the condition of each filter (See USAR Sections 9.10-1 and 9.10-9).

UNCONTROLLED ACCESS AREA SYSTEM:

The uncontrolled access area system is similar to that in the controlled access area, except that shut-off dampers are not installed, the exhaust is not filtered, and a single roof mounted centrifugal exhaust fan is employed.

Part of the uncontrolled access area, Room 81, houses a ventilation fan that is utilized in an Appendix R scenario to provide, if necessary, fresh air and help limit temperature rise.

The Auxiliary Building HVAC system boundaries are highlighted on the following P&ID drawings:

- 11405-M-2, Sheet 1, Revision 54, Auxiliary Bldg. Heating, Cooling, & Ventilation
- 11405-M-2, Sheet 2, Revision 60, Auxiliary Bldg. Heating, Cooling, & Ventilation
- 11405-M-2, Sheet 3, Revision 55, Auxiliary Bldg. Heating, Cooling, & Ventilation

More information about Auxiliary Building HVAC System can be found in USAR Section 9.10.

The Auxiliary Building HVAC component types subject to aging management review and their intended functions are shown in Table 2.3.3.11-1.

TABLE 2.3.3.11-1
AUXILIARY BUILDING HVAC
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Blower & Fan Housings	Pressure Boundary
Bolting	Pressure Boundary
Filter/strainer Housing	Pressure Boundary Pressure Boundary/Fission Product Retention
Fire Blocking Damper	Fire Barrier
Duct	Pressure Boundary
Dampers	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.12 CONTROL ROOM HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) AND TOXIC GAS MONITORING

The Control Room HVAC System conditions three individually controlled temperature zones: Shift Manager/mezzanine/lunchroom areas (Zone 1), the main control room area (Zone 2), and the computer room (Zone 3). Part of the air supply for Zone 2 is ducted through the control panels and instrumentation cabinets to provide direct cooling of the enclosed equipment.

The Toxic Gas Monitoring System provides a means of protecting the control room operators from an accidental release of toxic gas to meet NUREG-0737, Item III.D.3. The Toxic Gas Monitoring System, includes redundant ammonia detectors located inside the control room, with tubing run from the detectors to the fresh air intake to the Control Room HVAC System.

The Control Room HVAC System and Toxic Gas Monitoring System boundaries are highlighted on the following P&ID drawings:

- 11405-M-97, Sheet 1, Rev. 60, Miscellaneous Heating, Ventilating, and Air Conditioning System
- 11405-M-10, Sheet 1, Rev. 65, Auxiliary Coolant – Component Cooling System

More information about Control Room HVAC System can be found in USAR Section 9.10. More information about the Toxic Gas Monitoring System can be found in USAR Section 9.23.

The Control Room HVAC System and Toxic Gas Monitoring System component types subject to aging management review and their intended functions are shown in Table 2.3.3.12-1.

TABLE 2.3.3.12-1
CONTROL ROOM HVAC AND TOXIC GAS MONITORING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Blower & Fan Housing	Pressure Boundary
Bolting	Pressure Boundary
Filter/strainer	Pressure Boundary
Heat Exchanger	Pressure Boundary/Heat Transfer
Pipes & Fittings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.13 VENTILATING AIR

The Ventilating Air System is designed to maintain a suitable environment for equipment and personnel. Although the Ventilating Air System consists of equipment located in numerous areas, the passive equipment within the license renewal boundary is contained within the Emergency Diesel Generator rooms. This equipment is identified as emergency diesel generator air inlet louvers and radiator exhaust dampers (including the ductwork). The safety related function of the emergency diesel generator air inlet louvers is to admit air to the diesel generator rooms of the auxiliary building for combustion in and cooling of the emergency diesel generators. The safety related function of the radiator exhaust dampers (located in the radiator exhaust ducts) and ductwork is to discharge exhaust air from the emergency diesel generator radiators to the outside atmosphere.

The Ventilating Air System boundaries are highlighted on the following P&ID drawing:

- 11405-M-97, sheet 2, Revision 5, Misc. Heating, Ventilating & Air Conditioning

More information about Ventilating Air System can be found in USAR Section 9.10.

The Ventilating Air System component types subject to aging management review and their intended functions are shown in Table 2.3.3.13-1.

TABLE 2.3.3.13-1
VENTILATING AIR
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Dampers Housing	Pressure Boundary
Duct and Fittings	Pressure Boundary

2.3.3.14 FIRE PROTECTION

The Fire Protection System provides means for detecting, alarming, isolating and suppressing fires in the plant. The system is comprised of the following subsystems and attributes:

- The fire detection and alarm system is an instrumentation system that alerts control room operators of a fire and indicates its location.
- The fire suppression system includes fire-fighting equipment such as automatic sprinklers, automatic halon systems, standpipe hose stations, and outside fire hydrants.
- Fire Rated Assemblies are features of plant design and construction (e.g., fire barriers) which contribute to the separation of fire hazards into zones and fire areas and are addressed as part of the structure. Fire doors, fire dampers and penetration seals provide the necessary closures associated with openings in the fire rated barriers. Fire dampers are addressed in Section 2.3.3.12, Auxiliary Building Ventilation, and fire barriers including penetration seals and fire doors are addressed in Section 2.4.2.1, Auxiliary Building.
- The reactor coolant pump (RCP) lube oil collection subsystem is designed to collect oil from the RCPs and drain it to a collection tank to prevent a fire in the Containment Building during normal plant operations. This system is provided to comply with 10 CFR 50, Appendix R (Reference 2.3-2), Section III.0, *Oil Collection System For Reactor Coolant Pump.*

The plant is divided into unique fire areas as required by Appendix A to NRC Branch Technical Position APCSB 9.5-1 (Reference 2.3-3), and 10 CFR 50, Appendix R. Redundant safe shutdown related equipment, components and systems are provided with adequate spatial separation or are separated by fire resistive barriers as described in the Safe Shutdown Analysis.

Walls enclosing separate fire areas utilize fire resistive construction. Openings in plant fire barriers are protected by rated fire doors, dampers, and barrier penetration seals.

The Fire Protection System boundaries are highlighted on the following drawings:

- 11405-M-266, Sheet 1,Fire Protection Flow Diagram P&ID
- 11405-M-266, Sheet 1A, Fire Protection Flow Diagram P&ID
- 11405-M-266, Sheet 1B, Fire Protection Flow Diagram P&ID
- 11405-M-266, Sheet 8, Fire Protection Deluge System Details P&ID
- 11405-M-266, Sheet 8A, Fire Protection Deluge System Details P&ID
- 11405-M-266, Sheet 9, Fire Protection Dry Pipe and Deluge System Details P&ID
- 11405-M-266, Sheet 11,Radwaste Processing Chemical and Radiation Protection Office/Cafeteria Fire Protection System P&ID
- 11405-M-266, Sheet 12, New Warehouse Maintenance Shop and Support Area Fire Protection System P&ID
- 11405-M-259, Sheet 1, Flow Diagram Potable and Service Water System P&ID

- 11405-M-266, Sheet 10, Halon Piping System Switchgear room, Cable Spread Room, Control Room and Q.A. Vault

More information about Fire Protection can be found in USAR Section 9.11.

The Fire Protection System component types subject to aging management review and their intended functions are shown in Table 2.3.3.14-1.

TABLE 2.3.3.14-1
FIRE PROTECTION
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Flow Element/Orifice	Pressure Boundary
FP Sprinkler/Spray Nozzle	Pressure Boundary
Halon System Nozzle	Flow Restriction / Spray Pattern
Hose	Pressure Boundary
Hose Rack	Fire Hose Support
Pipes & Fittings	Pressure Boundary
Piping Spray Shield	Provide shelter/protection to safety-related components
Pressure Vessels	Pressure Boundary
Pump Casings	Pressure Boundary
Switch/bistable Housing	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.15 RAW WATER

The Raw Water (RW) System is an open-cycle cooling water system which uses screened water from the Missouri River. The system includes four parallel vertical mixed-flow pumps installed in the Intake Structure pump house. The pumps discharge into an interconnected header which splits into two parallel supply headers. The two supply headers run underground from the Intake Structure to the Auxiliary Building, where they join in an interconnected inlet header to the four Component Cooling Water (CCW) heat exchangers. Downstream of the CCW heat exchangers, the RW discharge header runs through the Turbine Building and discharges to the river via the circulating water discharge tunnel. RW piping and valves are also routed to selected equipment normally cooled by CCW, to provide a means of direct cooling as a backup to CCW. The discharge from the direct cooling portion of the RW system is routed through its own separate discharge header via the Turbine Building into the circulating water discharge tunnel. In the unlikely event of a design basis accident, all four RW pumps are started automatically and a Safety Injection Actuation Signal (SIAS) opens the RW isolation valves on all four CCW heat exchangers.

For license renewal purposes, the Intake Structure traveling screens are evaluated as part of the Raw Water System. There are three cells in the Intake Structure for the intake of river water, and each cell is served by two traveling screens.

The Raw Water System mechanical boundaries are highlighted on the following drawings:

- 11405-M-100, Raw Water Flow Diagram P&ID
- 11405-M-10, Sheet 1, Auxiliary Coolant Component Cooling System Flow Diagram P&ID
- 11405-M-10, Sheet 3, Auxiliary Coolant Component Cooling System Flow Diagram P&ID
- 11405-M-10, Sheet 4, Auxiliary Coolant Component Cooling System Flow Diagram P&ID
- 11405-M-40, Sheet 1, Auxiliary Coolant Component Cooling System Flow Diagram P&ID
- 11405-M-259, Sheet 1, Flow Diagram Potable & Service Water System P&ID
- 11405-M-257, Sheet 1, Flow Diagram Circulating Water P&ID

More information about the Raw Water System can be found in USAR Section 9.8.

The Raw Water System component types subject to aging management review and their intended functions are shown in Table 2.3.3.15-1.

TABLE 2.3.3.15-1
RAW WATER
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Flow Element/orifice	Pressure Boundary
Heat Exchanger	Heat Transfer Pressure Boundary
Indicator/recorder (sight glass)	Pressure Boundary
Orifice Plate	Flow Restriction Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casing	Pressure Boundary
Traveling Screen Frame	Structural Support
Valve Bodies	Pressure Boundary

2.3.3.16 COMPONENT COOLING

The Component Cooling Water (CCW) System (also known as the Auxiliary Coolant – Component Cooling Water System) is a closed loop system which transfers heat to the Raw Water System from various plant components. It provides a monitored intermediate barrier between these fluids and the Raw Water System. The system also serves as a cooling medium for the containment air coolers, steam generator blowdown sampling coolers, and the control room economizer coils. System components are rated for the maximum duty requirements that may occur during normal, shutdown, or accident modes of operation.

The CCW System is a closed loop consisting of three motor-driven circulating pumps, four heat exchangers, a surge tank, valves, piping, instrumentation, and controls. The water in the system is demineralized and deaerated and an inhibitor is added for protection against corrosion. Makeup is supplied to the surge tank through a level control valve from the Demineralized Water System.

The CCW System boundaries are highlighted on the following P&ID drawings:

- 1405-M-5, Sheet 1, Rev. 80, Demineralized Water System
- 11405-M-10, Sheet 1, Rev. 65, Auxiliary Coolant – Component Cooling System
- 11405-M-10, Sheet 2, Rev. 12, Auxiliary Coolant – Component Cooling System
- 11405-M-10, Sheet 3, Rev. 15, Auxiliary Coolant – Component Cooling System
- 11405-M-10, Sheet 4, Rev. 8, Auxiliary Coolant – Component Cooling System
- 11405-M-12, Sheet 1, Rev. 60, Primary Plant Sampling System
- 11405-M-40, Sheet 1, Rev. 33, Auxiliary Coolant – Component Cooling System
- 11405-M-40, Sheet 2, Rev. 28, Auxiliary Coolant – Component Cooling System
- 11405-M-40, Sheet 3, Rev. 22, Auxiliary Coolant – Component Cooling System
- 11405-M-119, Rev. 16, Auxiliary Coolant – Component Cooling System Control Element Drive Mechanism

More information about the CCW System can be found in USAR Section 9.7.

The Component Cooling Water System component types subject to aging management review and their intended functions are shown in Table 2.3.3.16-1.

TABLE 2.3.3.16-1
COMPONENT COOLING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Accumulators	Pressure Boundary
Bolting	Pressure Boundary
Flow Element/orifice	Pressure Boundary
Heat Exchanger	Pressure Boundary
Indicator/recorder (sight glass)	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.17 LIQUID WASTE DISPOSAL

The Liquid Waste Disposal (WD-L) System is used to collect, store, prepare for disposal, and dispose of liquid radioactive wastes.

Radioactive liquid wastes are generated as a result of plant operation, repair, and maintenance activities. These wastes must be collected, stored, processed, monitored and disposed of in order to protect the plant personnel and the general public from exposure to radiation.

The WD-L System is CQE at the containment penetration isolation valves. These portions of the waste disposal system must provide containment isolation in the event of a containment isolation actuation signal (CIAS). The containment isolation system was designed to prevent the release of radioactivity from containment, especially in the event of an accident. In the event of a Loss of Coolant Accident, the release of radioactivity is mitigated by establishing containment integrity. The floor drains in the Auxiliary Building are part of the WD-L System and perform an intended function for flood mitigation.

The WD-L System boundaries are highlighted on the following drawings:

- 11405-M-6, Sheet 1, Waste Disposal System Flow Diagram P&ID
- 11405-M-6, Sheet 2, Waste Disposal System Flow Diagram P&ID
- 11405-M-7, Sheet 1, Waste Disposal System Flow Diagram P&ID
- 11405-M-7, Sheet 1A, Waste Disposal System Flow Diagram P&ID
- 11405-M-7, Sheet 1B, Waste Disposal System Flow Diagram P&ID
- 11405-M-7, Sheet 2, Waste Disposal System Flow Diagram P&ID
- 11405-M-99, Sheet 1, Waste Disposal System Auxiliary Building Floor Drain Flow Diagram P&ID
- 11405-M-99, Sheet 2, Waste Disposal System Auxiliary Building Floor Drain Flow Diagram P&ID
- 11405-M-266, Sheet 8, Fire Protection Deluge System Details P&ID
- E-23866-210-130, Sheet 2 Safety Injection and Containment Spray System Flow Diagram P&ID

More information about the Liquid Waste Disposal System can be found in USAR Section 11.1.2.

The Liquid Radioactive Waste Disposal system component types subject to aging management review and their intended functions are shown in Table 2.3.3.17-1.

TABLE 2.3.3.17-1
LIQUID WASTE DISPOSAL
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary Water Suppression Support
Pipes & Fittings	Pressure Boundary Water Suppression Support
Valve Bodies	Pressure Boundary Water Suppression Support

2.3.3.18 GASEOUS WASTE DISPOSAL

The Gaseous Waste Disposal System includes the containment isolation valves that close on a Containment Isolation Actuation Signal (CIAS) and the piping between the containment penetrations and the containment isolation valves.

For license renewal purposes, the system boundary also includes the Volume Control Tank (VCT) pressure control valve, isolation valve and pressure instruments in the piping from the VCT to the gaseous waste disposal system. Also included are the waste gas compressor seal water heat exchangers that receive cooling water from the component cooling water system.

The Gaseous Waste Disposal System boundaries are highlighted on the following drawings:

- 11405-M-98,Sheet 1, Waste Disposal System Flow Diagram P&ID
- 11405-M-98, Sheet 3, Waste Disposal System Flow Diagram P&ID

More information about Gaseous Waste Disposal System can be found in USAR Section 11.1.3.

The Gaseous Waste Disposal System component types subject to aging management review and their intended functions are shown in Table 2.3.3.18-1.

TABLE 2.3.3.18-1
GASEOUS WASTE DISPOSAL
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Heat Exchanger	Pressure Boundary
Pipes & Fittings	Gaseous Discharge Path Pressure Boundary/Fission Product Retention
Valve Bodies	Gaseous Discharge Path Pressure Boundary Pressure Boundary/Fission Product Retention

2.3.3.19 PRIMARY SAMPLING

The Primary Sampling System includes components used to sample reactor coolant and steam generator blowdown. Apparatus and piping that may contain radioactive fluids are shielded. The principal items of equipment are the primary sampling panel, the Chemical and Volume Control System (CVCS) panel, the steam generator blowdown analyzer rack, the instrument panel, steam generator blowdown sample chiller, and the manual sampling sink and hood.

The boundary for the Primary Sampling System includes the containment penetration isolation valves and upstream tubing up to and including the RCS hot leg sample flow control valves, reactor vessel vent sample flow control valve, pressurizer surge line sample flow control valve and both steam generator blowdown sample isolation valves. Heat Exchangers/Coolers SL-3, 8A, 8B and 51 shell side and tubes are in scope as pressure boundary for the Component Cooling Water System.

The Primary Sampling System boundaries are highlighted on the following drawings:

- 11405-M-12, Sheet 1, Primary Plant Sampling System Flow Diagram
- 11405-M-253, Sheet 1, Flow Diagram Steam Generator, Feedwater and Blowdown

More information about Primary Sampling System can be found in USAR Section 9.13.2.1.

The Primary Sampling System component types subject to aging management review and their intended functions are shown in Table 2.3.3.19-1.

TABLE 2.3.3.19-1
PRIMARY SAMPLING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary/Fission Product Retention
Heat Exchanger	Pressure Boundary
Pipes & Fittings	Pressure Boundary/Fission Product Retention
Valve Bodies	Pressure Boundary/Fission Product Retention

2.3.3.20 RADIATION MONITORING – MECHANICAL

Permanently installed radiation monitors are provided for surveillance of plant effluents, critical process streams (process monitors), and personnel exposure levels in hazardous and potentially hazardous plant areas (area monitors). Monitoring and recording is required for liquid and gaseous releases. The monitoring program meets the requirements of 10 CFR Part 50, Appendix I and the Off-Site Dose Calculation Manual (ODCM). Process monitors measure Reactor Coolant System and primary to secondary leakage.

The Radiation Monitoring-Mechanical System consists of the CQE radiation monitors and their supporting components.

The Radiation Monitoring-Mechanical System boundary is highlighted on the following drawing:

- 11405-M-1, Sheet 2, Revision 25, Containment Heating Cooling & Ventilating Flow Diagram P&ID

More information about Radiation Monitoring-Mechanical System can be found in USAR Section 11.2.3.

The Radiation Monitoring-Mechanical System component types subject to aging management review and their intended functions are shown in Table 2.3.3.20-1.

TABLE 2.3.3.20-1
RADIATION MONITORING – MECHANICAL
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary/Fission Product Retention
Filters/strainers	Pressure Boundary/Fission Product Retention
Pipes & Fittings	Pressure Boundary/Fission Product Retention
Pump Casings	Pressure Boundary/Fission Product Retention
Valve Bodies	Pressure Boundary/Fission Product Retention

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

Steam and Power Conversion Systems act as a heat sink to remove heat from the reactor and convert the heat generated in the reactor to the plant's electrical output. The following systems are included in this subsection.

- Feedwater (2.3.4.1)
- Auxiliary Feedwater (2.3.4.2)
- Main Steam and Turbine Steam Extraction (2.3.4.3)

2.3.4.1 FEEDWATER

The Feedwater System consists of a supply line to each of the two steam generators. A feedwater isolation valve in each steam generator supply line is located just outside the containment penetration. These valves are motor operated, closing automatically on a Steam Generator Isolation Signal (SGIS). A check valve in each supply line, located inside containment, prevents uncontrolled blowdown from the affected steam generator in the event of a feedwater line break.

The license renewal boundary also includes the piping from the steam generators to the isolation valves for the Blowdown and Primary Sampling Systems.

The Feedwater System boundary is highlighted on the following drawing:

- 11405-M-253, Sheet 1, Flow Diagram Steam Generator Feedwater and Blowdown P&ID

More information about the Feedwater System can be found in USAR Section 10.

The Feedwater System component types subject to aging management review and their intended functions are shown in Table 2.3.4.1-1.

TABLE 2.3.4.1-1
FEEDWATER
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.4.2 AUXILIARY FEEDWATER

The Auxiliary Feedwater (AFW) System supplies feedwater to the steam generators whenever the Reactor Coolant System temperature is above 300 deg F and the Main Feedwater System is not in operation. The AFW system contains one emergency feedwater storage tank (EFWST), two pumps, plus related piping, valves, and instrumentation. One pump is electric motor driven and the other is steam turbine driven.

The flow path connects to the AFW nozzles on the steam generators. Either AFW pump can pump water from the EFWST to the steam generators. In the event of automatic initiation, the AFW system is designed to automatically start both AFW pumps and direct flow to the steam generators via the flow path to the AFW nozzles.

The AFW System boundaries are highlighted on the following drawings:

- 11405-M-253, Sheet 1, Flow Diagram Steam Generator Feedwater & Blowdown P&ID
- 11405-M-253, Sheet 4, Flow Diagram Steam Generator Feedwater & Blowdown P&ID
- 11405-M-254, Sheet 2, Flow Diagram Condensate P&ID
- E-4144, FW-10 Lube Oil Schematic P&ID

More information about Auxiliary Feedwater System can be found in USAR Section 9.4.

The Auxiliary Feedwater System component types subject to aging management review and their intended functions are shown in Table 2.3.4.2-1.

TABLE 2.3.4.2-1
AUXILIARY FEEDWATER
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Flow Element/Orifice Housing	Pressure Boundary
Heat Exchanger	Heat Transfer Pressure Boundary
Indicator/recorder (housing and sightglass)	Pressure Boundary
Pipes & Fittings	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Turbine Casing	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.4.3 MAIN STEAM AND TURBINE STEAM EXTRACTION

The portion of the Main Steam and Turbine Steam Extraction System within the scope of license renewal consists of the piping from each steam generator which penetrates the containment (steam generators are discussed in application Section 2.3.1.2). The piping outside containment includes the main steam safety valves and the Main Steam Isolation Valves (MSIVs). Also included in the Main Steam System boundary is the piping to the steam driven auxiliary feedwater pump and the associated drains and vents. The main steam check valves are the boundary valves for each of the individual lines, and the MSIV packing leakoff line isolation valve is the boundary after the leakoff piping connects into a common header.

The Main Steam and Turbine Steam Extraction System boundary is highlighted on the following drawing:

- 11405-M-252, Sheet 1, Flow Diagram Steam P&ID

More information about Main Steam and Turbine Steam Extraction System can be found in USAR Section 10.

The Main Steam and Turbine Steam Extraction System component types subject to aging management review and their intended functions are shown in Table 2.3.4.3-1.

TABLE 2.3.4.3-1
MAIN STEAM AND TURBINE STEAM EXTRACTION
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bolting	Pressure Boundary
Filters/strainers	Filtration Pressure Boundary
Pipes & Fittings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES

The determination of structures within the scope of license renewal is made by initially identifying Fort Calhoun Station structures and their design functions. Each structure is then reviewed to determine those that satisfy one or more of the criteria contained in 10 CFR 54.4. This process is described in Section 2.1 and the results of the structures review are included in Section 2.2. Section 2.1 also provides the methodology for determining the components within the scope of 10 CFR 54.4 that meet the requirements contained in 10 CFR 54.21(a)(1). The structures that meet these screening requirements are identified in this section. These identified structures require an aging management review for license renewal.

The results are provided below in two subsections:

- Containment (2.4.1)
- Other Structures (2.4.2)

The subsections provide tables of component types and intended functions. The intended functions in those tables are shortened versions. The shortened and full versions are shown below:

Intended Functions for Structural Component Types

Short Version	Full Version
Flood protection barrier	Provide flood protection barrier (internal and external flooding event)
HELB shielding	Provide shielding against high energy line breaks
Missile Barrier	Provide missile barrier (internally or externally generated)
Pipe whip restraint	Provide pipe whip restraint
Pressure boundary/ fission product retention	Provide pressure boundary or fission product retention barrier to protect public health and safety in the event of any postulated design basis events
Rated fire barrier	Provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
Shelter/protection to CQE	Provide shelter/protection to CQE components
Shielding against radiation	Provide shielding against radiation

Intended Functions for Structural Component Types

Short Version	Full Version
Spray shield or curbs	Provide spray shield or curbs for directing flow (e.g. safety injection flow to containment sump)
Structural support to CQE	Provide structural support to Non-CQE components whose failure could prevent satisfactory accomplishment of any of the required CQE functions
Structural support to CQE	Provide structural and / or functional support to CQE equipment

2.4.1 CONTAINMENT

The Containment structure is a partially prestressed, reinforced concrete, Class I structure composed of a cylindrical wall, domed roof and a bottom mat. The mat is common to both the Containment structure and the Auxiliary Building and is supported on steel piles driven to bedrock. The mat incorporates a depressed center portion for the reactor vessel. The Containment has a ¼" internal carbon steel liner. The unbonded tendons are in conduits filled with waterproof grease. The tendon anchors are accessible for inspection, testing, and re-tensioning via the tendon access gallery located directly beneath the cylinder wall and at the dome roof.

The reinforced concrete internal structure consists of several levels/compartments supported on the mat by concrete columns. The internal structure is isolated from the containment shell by a shake space which also permits the distribution and dissipation of any internal differential pressure during postulated accident events. There are several compartments which house mechanical equipment. They are the steam generator and reactor coolant pump compartments, pressurizer compartment, and the reactor cavity.

The Containment structure houses a substantial amount of CQE and Non-CQE mechanical and electrical equipment. There are many mechanical piping and electrical penetrations through the cylinder wall.

The system boundary includes all concrete, steel, elastomer, and fire barrier components within and including the domed roof and cylinder wall. This includes any components attached to the outside of the cylinder or dome above the Auxiliary Building roof. The prestressed/post-tensioned tendons, equipment and personnel hatches are within the system boundary. The mechanical and electrical penetration sleeves, bellows, welds between the sleeve and the liner, and welds between the sleeve and the penetration are included in the system boundary. Component Supports (e.g., pipe supports, cable tray supports, equipment supports, and associated anchorage), Fuel Handling Equipment/Heavy Load Cranes, and Building Piles are evaluated as commodities (application Section 2.4.2.6 for Component Supports, Section 2.4.2.5 for Fuel Handling Equipment /Heavy Load Cranes, and Section 2.4.2.4 for Building Piles).

More information about the Containment structure can be found in USAR Section 5.

The Containment structure component types subject to aging management review and their intended functions are shown in Table 2.4.1-1.

TABLE 2.4.1-1
CONTAINMENT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Calcium Silicate Board in Ambient Air	Rated fire barrier
Containment Carbon Steel Threaded Fasteners in Ambient Air	Flood protection barrier Pipe whip restraint HELB shielding Structural support to Non-CQE Structural support to CQE
Containment Concrete Above Grade	Flood protection barrier Rated fire barrier Shelter/protection to CQE Structural support to CQE Missile Barrier
Containment Concrete Below Grade	Flood protection barrier Rated fire barrier Shelter/protection to CQE Structural support to CQE Missile Barrier

TABLE 2.4.1-1 (CONTINUED)
CONTAINMENT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Containment Concrete in Ambient Air	Flood protection barrier Rated fire barrier Shelter/protection to CQE Structural support to CQE Spray shield or curbs Missile Barrier HELB shielding Pipe whip restraint
Containment Equipment Access Hatch and Personnel Air Lock	Pressure boundary/fission product retention
Containment Equipment Access Hatch Gasket	Pressure boundary/fission product retention
Containment Grout in Ambient Air	Structural support to CQE
Containment Mechanical and Electrical Penetrations	Pressure boundary/fission product retention
Containment Mechanical Penetrations With Bellows	Pressure boundary/fission product retention
Containment Prestressing/post-tensioning Tendons	Shelter/protection to CQE Structural support to CQE Missile Barrier
Containment Stainless Steel Threaded Fasteners	Pressure boundary/fission product retention
Containment Steel Liner	Pressure boundary/fission product retention

TABLE 2.4.1-1 (CONTINUED)
CONTAINMENT
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Containment Structural Steel in Ambient Air	Rated fire barrier Pipe whip restraint HELB shielding Structural support to Non-CQE Structural support to CQE
Fuel Transfer Penetration	Pressure boundary/fission product retention
Reactor Cavity Seal Ring	Pressure boundary/fission product retention
Reactor Vessel Missile Shields	Missile Barrier
Refueling Cavity Liner	Pressure boundary/fission product retention
Trisodium Phosphate Baskets	Structural support to CQE Shelter/protection to CQE

2.4.2 OTHER STRUCTURES

The following structures are included in this subsection:

- Auxiliary Building (2.4.2.1)
- Turbine Building and Service Building (2.4.2.2)
- Intake Structure (2.4.2.3)
- Building Piles (2.4.2.4)
- Fuel Handling and Heavy Load Handling Equipment (2.4.2.5)
- Component Supports (2.4.2.6)
- Duct Banks (2.4.2.7)

2.4.2.1 AUXILIARY BUILDING

The Auxiliary Building is a multi-floored, reinforced concrete, Class I structure. From the bottom of the foundation mat to the roof elevation, the structure is of box-type construction with internal bracing provided by vertical concrete walls and horizontal floor slabs. The spent fuel pool is contained within the Auxiliary Building and consists of a stainless steel lined concrete structure. The Auxiliary Building masonry walls in the area of safety-related equipment have been reinforced to provide protection for Class I equipment and components located nearby.

More information about the Auxiliary Building can be found in USAR Section 5.11.4.

The Auxiliary Building component types subject to aging management review and their intended functions are shown in Table 2.4.2.1-1.

TABLE 2.4.2.1-1
AUXILIARY BUILDING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Auxiliary Building Carbon Steel Expansion/grouted Anchors	Structural support to Non-CQE Pipe whip restraint HELB shielding Structural support to CQE

TABLE 2.4.2.1-1 (CONTINUED)
AUXILIARY BUILDING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Auxiliary Building Carbon Steel Threaded Fasteners	Flood protection barrier Structural support to Non-CQE Pipe whip restraint HELB shielding Structural support to CQE Shelter/protection to CQE
Auxiliary Building Concrete Below Grade	Flood protection barrier Shelter/protection to CQE Structural support to CQE
Auxiliary Building Concrete in Ambient Air	Flood protection barrier Rated fire barrier Shelter/protection to CQE Structural support to CQE Missile Barrier
Auxiliary Building Concrete in Ambient Air	Rated fire barrier Structural support to CQE HELB shielding Shelter/protection to CQE Flood protection barrier Shelter/protection to CQE
Auxiliary Building Fire Penetration Barriers	Rated fire barrier

TABLE 2.4.2.1-1 (CONTINUED)
AUXILIARY BUILDING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Auxiliary Building Flood Panel Seals	Flood protection barrier
Auxiliary Building Grout in Ambient Air	Structural support to CQE Pipe whip restraint
Auxiliary Building Masonry in Ambient Air	Structural support to Non-CQE Rated fire barrier
Auxiliary Building Pressure Relief Panels	Shelter/protection to CQE
Auxiliary Building Pyrocrete®	Rated fire barrier
Auxiliary Building Removable Slab Lifting Devices – Bronze	Structural support to Non-CQE
Auxiliary Building Structural Steel	Flood protection barrier HELB shielding Structural support to Non-CQE Pipe whip restraint Structural support to CQE Shelter/protection to CQE
Diesel Fuel Oil Tank Foundation	Structural support to CQE
Diesel Generator Missile Shield Enclosure Concrete Below Grade	Structural support to CQE
Diesel Generator Missile Shield Enclosure Concrete in Ambient Air	Structural support to CQE
Diesel Generator Missile Shield Enclosure Concrete in Ambient Air	Structural support to CQE Shelter/protection to CQE

TABLE 2.4.2.1-1 (CONTINUED)
AUXILIARY BUILDING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Safety Injection and Refueling Water Tank	Pressure boundary
Spent Fuel Pool Liner	Pressure boundary

2.4.2.2 TURBINE BUILDING AND SERVICE BUILDING

The Turbine and Service Buildings are multi-floored Class II structures. From the basement floor to the operating floor, the structure is a box-type, reinforced concrete structure with internal bracing provided by concrete walls, floor slabs and structural steel. The mat foundation is supported on steel piles driven to bedrock. From the operating floor to the roof, the structure is a braced steel frame clad with aggregate resin panels. The multi-layered built-up roof is supported by metal decking spanning between open web steel joists. The turbine generator is located on the operating floor. It is supported by a mass concrete structure referred to as the turbine pedestal. The turbine pedestal is independent from the Turbine Building structure. The Turbine Building houses both Limited CQE and non-CQE systems and components as well as main steam and feedwater High Energy Line Break (HELB) restraints/shields.

From the Service Building's first floor to the roof, the structure is a braced steel frame clad with aggregate resin panels. The multi-layered built up roof is supported by metal decking spanning between open web steel joists. The mat foundation is supported on steel piled driven to bedrock. The Service Building houses both CQE and non-CQE systems and components. A CQE component for the Raw Water System, HCV-2861, is located in the basement of the Service Building.

The turbine pedestal is included in the system boundary. Component Supports (e.g., pipe supports, cable tray supports, conduit supports, equipment supports and equipment anchorage) (application Section 2.4.2.6), and Piles (application Section 2.4.2.4) are evaluated as commodities.

More information about the Turbine and Service Buildings can be found in USAR Section 5.11.

The Turbine and Service Building component types subject to aging management review and their intended functions are shown in Table 2.4.2.2-1.

TABLE 2.4.2.2-1
TURBINE BUILDING AND SERVICE BUILDING
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Turbine Building Carbon Steel Expansion / Grouted Anchors	Structural support
Turbine Building Carbon Steel Threaded Fasteners in Ambient Air	Structural support
Turbine Building Concrete Above Grade	Structural support
Turbine Building Concrete Below Grade	Structural support
Turbine Building Concrete in Ambient Air	Structural support
Turbine Building Grout in Ambient Air	Structural support Pipe whip restraint HELB shielding
Turbine Building Main Steam and Feedwater HELB Shields and Restraints in Ambient Air	Pipe whip restraint HELB shielding
Turbine Building Structural Steel in Ambient Air	Structural support

2.4.2.3 INTAKE STRUCTURE

The intake structure is a multi-floored Class 1 structure. From the bottom of the foundation mat to 7 feet above the operating floor, the structure is a box-type reinforced concrete structure with internal bracing provided by concrete walls and floor slabs. The mat foundation is supported on steel pipe piles driven to bedrock. Above the reinforced concrete structure to the roof, the structure is a braced steel frame clad with aggregate resin panels. The multi-layered built-up roof is supported by metal decking spanning between open web steel joists. The Intake Structure houses and protects both CQE and non-CQE systems and components. The diesel driven fire pump fuel tank enclosure is included in the Intake Structure.

The enclosure for the diesel driven fire pump fuel tank is included in the system boundary. Component Supports (e.g., pipe supports, cable tray supports, equipment supports, and associated anchorage) (application Section 2.4.2.6), Fuel Handling Equipment and Heavy Load Cranes (application Section 2.4.2.5), and Piles (application Section 2.4.2.4) are evaluated as commodities. Manhole MH-31 cover and flange, elastomer joint and frame, and the foam blocks inside the manhole are evaluated in Duct Banks (application Section 2.4.2.7).

The Intake Structure component types subject to aging management review and their intended functions are shown in Table 2.4.2.3-1.

TABLE 2.4.2.3-1
INTAKE STRUCTURE
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Bronze Gland and Gland Bolting	Flood protection barrier
Carbon Steel Expansion/grouted Anchors	Rated fire barrier Structural support
Carbon Steel Pipe and Pipe Casing Floor Penetration	Flood protection barrier
Carbon Steel Pipe Sleeve and Flange Floor Penetration	Flood protection barrier
Carbon Steel Threaded Fasteners Inside Building	Flood protection barrier Structural support

TABLE 2.4.2.3-1 (CONTINUED)
INTAKE STRUCTURE
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Cast Iron Stuffing Box Floor Penetration	Flood protection barrier
Concrete Below Grade	Flood protection barrier Shelter/protection to CQE Provide source of cooling water for plant shutdown Structural support
Concrete Exposed To Raw Water	Flood protection barrier Provide source of cooling water for plant shutdown Structural support
Concrete In Ambient Air	Flood protection barrier Rated fire barrier
Concrete Interior	Flood protection barrier Rated fire barrier Missile barrier Shelter/protection
EDPM Rubber Link-seal®	Flood protection barrier
Fire Protection Pyrocrete®	Rated fire barrier
Flood Panel Seals	Flood protection barrier
Grout Protected From Weather	Structural support
Sand and Gravel Surrounding The Diesel Fire Pump Fuel Oil Storage Tank	Rated fire barrier
Stainless Steel Strainer Backwash Piping Floor Penetration	Flood protection barrier
Stainless Steel Threaded Fasteners	Flood protection barrier

TABLE 2.4.2.3-1 (CONTINUED)
INTAKE STRUCTURE
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Structural Steel in Ambient Air	Flood protection barrier Shelter/protection

2.4.2.4 BUILDING PILES

The Building Piles commodity group consists of four types of piles: Class A steel pipe piles, Class B steel pipe piles, concrete caissons, and steel H-piles.

Class A piles are 20" OD open-end pipe piles with 1.031" thick walls driven to bedrock. The piles are filled with sand to the point four feet below the top of the pile. The remaining top four feet is filled with concrete. Class A piles are capped with a two-inch thick steel plate end closure. Class I structures (e.g., Containment, Auxiliary Building, and Intake Structure) are founded on Class A piles. Class A piles are also used for support of the turbine generator foundation located in the Turbine Building.

Class B piles are 12.75" OD closed-end pipe piles with 0.25" thick walls and filled with concrete. Class B piles are capped with a 1.25" steel plate end closure. Class II structures (e.g., Turbine Building and Service Building) are founded on Class B piles driven to bedrock.

Concrete caissons are three-foot diameter reinforced concrete cylinders that extend ten feet into bedrock. They support the diesel generator missile shield enclosure.

Steel H-piles are used in the foundations of yard transformers, the Condensate Storage Tank (DW-48), the Auxiliary Boiler Fuel Oil Storage Tank (FO-10), and the Diesel Engine Fuel Oil Storage Tank (FO-1). Only the piles used in the foundation of the Diesel Engine Fuel Oil Storage Tank have an intended function and therefore are within the scope of license renewal.

The commodity boundary includes all deep foundation piles within the scope of license renewal consisting of Class A, Class B, concrete caisson, and H-pile designs.

More information about Building Piles can be found in USAR Section 5.7.

The Building Piles component types subject to aging management review and their intended functions are shown in Table 2.4.2.4-1.

TABLE 2.4.2.4-1
BUILDING PILES
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Class A Pipe Piles	Structural suppor Flood protection barrier
Class B Pipe Piles	Structural support
Class B Pipe Pile Concrete	Structural support
Concrete Caissons	Structural support
Steel H-Piles	Structural support

2.4.2.5 FUEL HANDLING EQUIPMENT AND HEAVY LOAD CRANES

This commodity includes all components used in the storage and handling of new/spent fuel and in the hoisting of loads.

The fuel handling equipment portion of this commodity consists of the refueling machine, tilting machines in Containment and in the Auxiliary Building, fuel transfer conveyor, fuel transfer carrier box, fuel transfer tube, new and spent fuel handling tools, new and spent fuel storage racks, and spent fuel bridge.

The heavy load cranes portion of this commodity consists of eight (8) cranes of varying types (i.e., overhead crane, hoist with monorail, and jib crane).

The following is a list of the commodity components which are considered passive and long-lived (i.e., in the scope of license renewal): structural members used for the support of the fuel handling equipment, crane rail system, structural members used for the support of the bridge and trolley, hoist monorails.

More information about Fuel Handling Equipment can be found in USAR Section 9.5.

The Fuel Handling Equipment and Heavy Load Cranes component types subject to aging management review and their intended functions are shown in Table 2.4.2.5-1.

TABLE 2.4.2.5-1
FUEL HANDLING EQUIPMENT AND HEAVY LOAD CRANES
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Concrete Slab Removal Cranes	Structural support
Containment Crane	Structural support
Containment Equipment Hatch Crane and Jib	Structural support
Deborating Demineralizing Area Crane	Structural support
Fuel Transfer Conveyor	Structural support
Fuel Transfer Carrier Box	Structural support
Fuel Transfer Tube	Structural support
New and Spent Fuel Handling Tools	Structural support
New Fuel Storage Rack	Structural support

TABLE 2.4.2.5-1 (CONTINUED)
FUEL HANDLING EQUIPMENT AND HEAVY LOAD CRANES
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Refueling Area Crane	Structural support
Refueling Machine	Structural support
Spent Fuel Bridge	Structural support
Spent Fuel Storage Racks	Structural support
Tilting Machines	Structural support
Upper Guide Lift Rig	Structural support
Waste Evaporator Equipment Handling Crane	Structural support

2.4.2.6 COMPONENT SUPPORTS

The Component Supports commodity group consists of the structural connection between a system, or component within a system and a plant building structural concrete or steel member. Supports for both the distributive portion of systems (pipe, conduit, tubing, raceway) and the system's equipment are included.

Component Supports include all Seismic Category I and II/I supports for pipe, conduit, raceway, tubing, ventilation duct, and equipment supports. Electrical equipment enclosures for junction boxes, panels, cabinets and switchgear are also addressed with the Component Supports commodity group. The exposed portion of the anchor bolts associated with the support are also included.

Snubbers are active components and do not require an aging management review. The structural components that attach the snubber to the piping and to the building are included with the component supports. The snubber support includes the subcomponents from the snubber pin connections to the structural component (wall, floor, beam) and from the other snubber pin connection to the pipe or component being supported.

The commodity boundary includes all steel and grout for CQE and Limited CQE Component Supports in the Containment structure, Auxiliary Building, Intake Structure, and Manholes 5 and 31. Manholes 5 and 31 are CQE yard structures that access CQE electrical cables.

The Component Support commodity group includes ASME piping class 1, 2 and 3 pipe supports and equipment anchorage, CQE and Limited CQE supports for cable trays, conduits, HVAC ducts, tube track and tubing. It also includes anchorage of racks, panels, cabinets and enclosures for electrical equipment. The embedded portion of the anchor bolt and the structural integrity of the concrete are discussed in the applicable structure.

Jet impingement barriers and pipe whip restraints that are relied upon in the high-energy line break analysis are evaluated for the effect of aging as part of the structure that houses these components.

More information about Component Supports can be found in USAR Section 1.2.6 and USAR Appendix F, Section 2.5.

The Component Supports component types subject to aging management review and their intended functions are shown in Table 2.4.2.6-1.

TABLE 2.4.2.6-1
COMPONENT SUPPORTS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Component Support Carbon Structural Steel in Ambient Air	Structural support
Component Support Carbon Structural Steel in Ambient Air	Structural support
Component Support Carbon Steel Threaded Fasteners in Ambient Air	Structural support
Component Support Carbon Steel Threaded Fasteners in Ambient Air	Structural support
Component Support Epoxy Grout in Ambient Air	Structural support
Component Support Grout in Ambient Air	Structural support
Component Support High Strength Carbon Steel Threaded Fasteners in Ambient Air	Structural support
Component Support Lubrite Plate in Ambient Air	Structural support
Component Support Stainless Structural Steel in Ambient Air	Structural support
Component Support Stainless Structural Steel in Borated Treated Water	Structural support
Component Support Stainless Steel Threaded Fasteners in Ambient Air	Structural support
Component Support Carbon Steel Vibration Isolators in Ambient Air	Structural support

TABLE 2.4.2.6-1 (CONTINUED)
COMPONENT SUPPORTS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Component Support Weathering Carbon Steel in Ambient Air	Structural support

2.4.2.7 DUCT BANKS

Duct banks are comprised of conduits encased in concrete and are located below grade. Duct banks are used to route electrical power cables between buildings. Electrical manholes are reinforced concrete box-type structures which allow for inspection and routing of the cables. Duct banks and electrical manholes contain both CQE and Non-CQE cables. Only the duct banks and electrical manholes of Class I design that contain CQE cables are within the scope of license renewal.

The boundary for duct banks includes all concrete, carbon steel, gray cast iron, polyurethane foam and elastomer materials that form the electrical manholes and duct banks which connect the southeast corner of the Auxiliary Building at Pull Boxes 129T and 128T to the Intake Structure at manhole MH-31. From the pull boxes, the two duct banks combine and connect to manhole MH-5. From manhole MH-5, the duct bank continues to the Intake Structure where it connects at manhole MH-31. A flexible elastomer joint is used to connect the duct bank to manhole MH-31 to provide for seismic isolation. The elastomer joint and frame, manhole cover and flange, and foam blocks of manhole MH-31 are within the structure boundary. Exposed conduit, conduit fittings, and seismic supports of manhole MH-31 are evaluated in Component Supports (application Section 2.4.2.6). All other portions of manhole MH-31 are evaluated as part of the Intake Structure (application Section 2.4.2.3). The embedded plastic and galvanized steel conduits were used as formwork during construction and are not within the structure boundary and not within the scope of license renewal. Component Supports (e.g., cable tray, cable tray supports, pull boxes, associated anchorage) are evaluated as commodities (application Section 2.4.2.6).

More information about Duct Banks can be found in USAR Section 8.5.

The Duct Bank component types subject to aging management review and their intended functions are shown in Table 2.4.2.7-1.

TABLE 2.4.2.7-1
DUCT BANKS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Concrete In Ambient Air	Shelter/protection to CQE Missile barrier
Concrete Below Grade	Structural support Shelter/protection to CQE Missile barrier
Interior Concrete	Structural support Shelter/protection to CQE Missile barrier
Manhole MH-31 Cover	Structural support Missile barrier
Manhole MH-31 Flange	Structural support Missile barrier
Manhole MH-31 Foam Blocks	Flood protection barrier
Manhole MH-5 Cover and Flange	Structural support Missile barrier

2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL

The determination of electrical systems within the scope of license renewal is made by initially identifying Fort Calhoun Station electrical systems and their design functions. Each system is then reviewed to determine those that satisfy one or more of the criteria contained in 10 CFR 54.4. This process is described in Section 2.1 and the results of the electrical systems review are included in Section 2.2. Section 2.1 also provides the methodology for determining the components within the scope of 10 CFR 54.4 that meet the requirements contained in 10 CFR 54.21(a)(1). The components that meet these screening requirements are identified in this section. These identified components require an aging management review for license renewal.

The results include the following electrical items:

- Cables and Connectors (2.5.1)
- Containment Electrical Penetrations (2.5.2)
- Engineered Safeguards (2.5.3)
- Nuclear Instrumentation (2.5.4)
- Reactor Protection System (2.5.5)
- 4160 VAC (2.5.6)
- 480 VAC Bus (2.5.7)
- 480 VAC MCCs (2.5.8)
- 125 VDC (2.5.9)
- 120 VAC (2.5.10)
- Plant Computer – Emergency Response Facility Computer (2.5.11)
- Qualified Safety Parameter Display (2.5.12)
- Radiation Monitoring (2.5.13)
- Electrical Equipment (2.5.14)
- Auxiliary Instrumentation (2.5.15)
- Control Board (2.5.16)
- Diverse Scram System (2.5.17)
- Communications (2.5.18)
- Emergency Lighting (2.5.19)
- Bus Bars (2.5.20)

2.5.1 CABLES AND CONNECTORS

The components for the Fort Calhoun Station evaluated in this section of the application encompass the passive, long-lived EQ and Non-EQ electrical cables and connectors which support an intended function as defined by 10 CFR Part 54.21(a)(1)(i). Cables and their associated connectors perform the function of providing electrical energy (either continuously or intermittently) to power various equipment and components throughout the plant to enable them to perform their intended functions. Cables and connectors associated with the 10 CFR

50.49 program (Environmental Qualification) are addressed either as short lived and periodically replaced, or as long-lived Time Limited Aging Analysis (TLAA) candidates; as such, those candidates are not included in the set of cables and connectors requiring additional aging management review.

More information about Cables and Connectors can be found in USAR Section 8.

The Cables and Connector component types subject to aging management review and their intended functions are shown in Table 2.5.1-1.

TABLE 2.5.1-1
CABLES AND CONNECTORS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Electrical Cable	Electrical Continuity
Connector	Electrical Continuity
Splice	Electrical Continuity
Fuse Block	Electrical Continuity
Terminal Block	Electrical Continuity

2.5.2 CONTAINMENT ELECTRICAL PENETRATIONS

The components for the Fort Calhoun Station evaluated in this section of the application encompass the passive, long-lived electrical penetrations which support an intended function as defined by 10 CFR 54.21(a)(1)(i). (Note: The mechanical portion of the electrical penetrations are addressed in Section 2.3.2.2, Containment Penetration and System Interface Components for Non-CQE Systems.) Electrical penetrations perform the functions of a containment boundary component and provide electrical energy across the containment boundary (either continuously or intermittently) to power various equipment and components throughout the plant to enable them to perform their intended functions. Penetrations associated with the 10 CFR 50.49 program (Environmental Qualification) are addressed either as short lived and periodically replaced, or as long-lived Time Limited Aging Analysis (TLAA) candidates; as such, those candidates are not included in the set of penetrations requiring additional aging management review. The electrical penetration provides an electrical connection between two sections of the Electrical/I&C circuit. The pigtail at each end of the penetration is connected to the field cable in various ways. The boundary for the electrical penetrations includes the pigtail cable. All FCS Non-EQ Electrical Penetrations were evaluated in this assessment.

More information about Containment Electrical Penetrations can be found in USAR Section 5.9.3.

The Containment Electrical Penetrations component types subject to aging management review and their intended functions are shown in Table 2.5.2-1.

TABLE 2.5.2-1
CONTAINMENT ELECTRICAL PENETRATIONS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Electrical Penetrations	Electrical Continuity Pressure Boundary

2.5.3 ENGINEERED SAFEGUARDS

The Engineered Safeguards System provides the equipment necessary to initiate the required safeguards functions. The system also monitors the power sources acting to assure the availability of emergency power for operation of at least the minimum Engineered Safeguards.

The Engineered Safeguards System was designed and installed as two independent, functionally redundant systems called the "A" train and the "B" train. Automatic sequencers for starting safeguards pumps, fans and support auxiliaries are duplicated in each of the "A" and "B" trains. Each of the four sequencers operates with a separate control power source and distribution system. Any one sequencer operating alone automatically actuates minimum safeguards.

The Engineered Safeguards Control and Instrumentation Subsystem includes control devices and circuits for automatic initiation, control, supervision, and manual test of the Engineered Safety Features systems and components, and their essential auxiliary support systems. The system does not include sensing instrumentation and does not include the Auxiliary Feedwater Actuation System.

All CQE electrical components within the engineered safeguards system have been evaluated as within the license renewal boundary with the exception of the temperature indication controller (TIC-866) for the Containment HVAC system, chassis, junction boxes, panels, and cables and connectors. TIC-866 is evaluated as part of the Containment HVAC System (application Section 2.3.3.10). Chassis, junction boxes, and panels were incorporated into the Component Supports commodity group and are evaluated separately (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about the Engineered Safeguards System can be found in USAR Section 7.3.

No components in the Engineered Safeguards System license renewal boundary are subject to aging management review.

2.5.4 NUCLEAR INSTRUMENTATION

The Nuclear Instrumentation System includes both narrow range and wide range out-of-core neutron flux detectors. The Nuclear Instrumentation System includes power supplies, relays, switches, sensors, amplifiers, indicators and other equipment needed to monitor and display reactor power. Equipment is included for testing and adjusting the values displayed by the nuclear instrumentation.

All CQE electrical components within the Nuclear Instrumentation System have been considered and have been evaluated as in the license renewal boundary with the exception of junction boxes and cables and connectors. Junction boxes were incorporated into the Component Supports commodity group and are evaluated separately (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about Nuclear Instrumentation System can be found in USAR Section 7.5.2.

No components in the Nuclear Instrumentation System license renewal boundary are subject to aging management review.

2.5.5 REACTOR PROTECTION SYSTEM

The Reactor Protection System consists of sensors, amplifiers, power supplies, logic, and other equipment necessary to monitor selected nuclear steam supply system conditions and to effect reliable and rapid reactor shutdown if any one or combination of conditions deviates from a preselected operating range to protect the reactor core. The normal logic is two-out-of-four to trip. Open circuiting, or loss of power supply for the channel logic, initiates an alarm and a channel trip. The system also provides two methods to manually trip the reactor.

The Reactor Protection System includes power supplies, relays, switches, sensors, amplifiers, and other equipment needed to monitor selected safety parameters and provide logic to supply four variable trip paths (four measurement channels). The system also contains relays that operate on a specified logic (typically a two-out-of-four coincidence logic) to maintain power to, or remove power from, the control element drive mechanism clutches.

All CQE electrical components within the Reactor Protection System have been evaluated as within the license renewal boundary, with the exception of chassis, panels, and cables and connectors. Chassis and panels were incorporated into the Component Supports commodity group and are evaluated separately (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about the Reactor Protection System can be found in USAR Section 7.2.

No components in the Reactor Protection System license renewal boundary are subject to aging management review.

2.5.6 4160 VAC

The 4160 VAC System comprises the first level of the plant ac distribution system. Switchgear buses 1A1 and 1A3 constitute one train, typically referred to as the "A" train. Each switchgear bus is provided with two supply breakers. One supply breaker is connected to unit auxiliary transformer T1A-1 secondary and the other supply breaker is connected to the secondary of house service transformer T1A-3 through non-segregated phase bus duct. Switchgear bus 1A1 is normally supplied from unit auxiliary transformer T1A-1 when the plant is in normal operation and the generator is on-line, or when the plant is shutdown and the generator is off-line and the generator disconnect switch is opened. Switchgear bus 1A3 normally remains supplied from the house service transformer T1A-3.

Switchgear buses 1A2 and 1A4 constitute the other train, typically referred to as the "B" train. Each switchgear bus is provided with two supply breakers. One supply breaker is connected to unit auxiliary transformer T1A-2 secondary and the other supply breaker is connected to the secondary of house service transformer T1A-4 through non-segregated phase bus duct. Switchgear bus 1A2 is normally supplied from unit auxiliary transformer T1A-2 when the plant is in normal operation and the generator is on-line, or when the plant is shutdown and the generator is off-line and the generator disconnect switch is opened. Switchgear bus 1A4 normally remains supplied from the house service transformer T1A-4.

Switchgear buses 1A1 and1A2 distribute the electrical energy to Non-CQE motors through feeder circuit breakers.

Switchgear buses 1A3 and 1A4 distribute electrical energy to CQE and Non-CQE loads through feeder circuit breakers and can be tied to the emergency power source from the diesel generators. When off site power is not available, all Non-CQE loads are shed when power is supplied from the diesel generators. Switchgear buses 1A1 and 1A2 distribute electrical energy to Non-CQE motors through feeder circuit breakers. These buses and their associated loads are not included in the license renewal boundary.

All breakers, relays, and indicators tied to buses 1A3 and 1A4 are CQE and considered within the license renewal boundary. The associated loads and end devices connected and fed by these buses are addressed in their respective system scoping analyses and engineering analyses (e.g., 480 VAC system, 125 VAC system and 120 VAC system). Undervoltage relay (27-1/1A4), that monitors the voltage on 4160 VAC bus 1A4, panels, buses, and cables & connectors was transferred from the 120 VAC system and was evaluated as part of the 4160 VAC system.

All CQE electrical components within the 4160 VAC system have been evaluated as being within the license renewal boundary with the exception of transformer T1B-4A, panels, buses, and cables and connectors. Transformer T1B-4A, was transferred to the 480 Volt AC Bus System to coincide with similar units (application Section 2.5.7). Panels are evaluated with component supports (application Section 2.4.2.6). Buses were identified as a commodity group and are evaluated separately (application Section 2.5.20). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

More information about 4160 VAC System can be found in USAR Section 8.3.1.

No components in the 4160 VAC System license renewal boundary are subject to aging management review.

2.5.7 480 VAC BUS

The main 480 VAC buses comprise three double-ended load centers, each with three bus sections. The center bus section of each can be tied to either adjacent bus section, but not both if the adjacent sections are energized from their associated 4160/480 VAC transformers. This is prevented by electrical control circuit interlocked bus-tie circuit breakers. Each center bus section is normally connected to the "preferred" adjacent bus section by means of a normally closed bus-tie circuit breaker. Thus, the center bus sections are each part of one of the two separate systems, starting with 4160 VAC main buses 1A3 and 1A4, between which redundant engineered safeguards features and other essential auxiliaries are divided.

Each double-ended load center group is provided with two dc control power feeders, one from each dc system and a manual transfer switch to ensure availability of control power. The six load center transformers are throat-connected and provided with surge protection on the 4160 VAC side.

The 480 VAC Bus System is primarily responsible for the delivery of electrical energy to both CQE and Non-CQE equipment and motor control centers. Nine 480 VAC bus sections are used to distribute the electrical energy and are considered to be within the scope of license renewal. The nine bus sections are fed from six 4160/480 VAC transformers, which are also included in the scope of license renewal. The associated loads and end devices connected and fed by these buses are addressed in their respective system scoping analyses.

All CQE electrical components within the 480 VAC Bus System have been evaluated as being within the license renewal boundary with the exception of "breaker spaces," panels, buses, and cables and connectors. Breaker spaces contain no components. Panels are evaluated with component supports (application Section 2.4.2.6). Buses were identified as a commodity group and are evaluated separately (application Section 2.5.20). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

More information about 480 VAC buses can be found in USAR Section 8.3.2.

No components in the 480 VAC buses license renewal boundary are subject to aging management review.

2.5.8 480 VAC MCC

The 480 VAC Motor Control Center (MCC) System is arranged into two independent trains to meet the single failure criteria. Twenty-three motor control centers are contained within the plant.

The 480 VAC MCC System is primarily responsible for the delivery of electrical energy to both CQE and Non-CQE equipment. The associated loads and end devices connected and fed by these motor control centers are addressed in their respective system scoping analyses. All CQE electrical components within the 480 VAC MCC system have been evaluated as being within the license renewal boundary, with the exception of panels and cables and connectors. Panels are evaluated with component supports (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

More information about the 480 VAC MCC System can be found in USAR Section 8.3.2.

No components in the 480 VAC MCC System license renewal boundary are subject to aging management review.

2.5.9 125 VDC

The direct current (dc) systems are designed as the basic sources of energy for plant control and instrumentation in all categories, and to operate without interruption during accident conditions and the following adverse environmental conditions: design basis accident, maximum hypothetical earthquake, tornado, flood, missiles, ambient radiation, temperature, and humidity.

The 125 VDC System consists of three battery chargers (EE-8C, EE-8D, EE-8E), two lead-acid storage batteries (EE-8A, EE-8B), two main distribution panels (EE-8F, EE-8G), six branch distribution panels (AI-41A, AI-41B, 1, 1A, 2, 2A), two battery discharge test circuit breakers (EE-8R, EE-8S) and manual transfer switches. This equipment is arranged to provide two independent dc distribution system trains.

The two station lead-acid storage batteries provide the required electrical energy source for the plant dc motors, emergency lighting, controls and instrumentation for eight hours upon loss of ac power to the battery charger. The battery capacities are based on a defined battery duty cycle for the eight-hour duration.

The battery chargers are solid-state, rated at 400 amperes, designed for constant voltage operation up to a nominal 380 amperes, and have a current limiting characteristic beyond the nominal 380 amperes.

The main distribution panel transfers the electrical energy from the battery charger and/or battery to the branch distribution panels and directly to plant control and instrumentation loads. The branch distribution panels transfer the electrical energy to the dc motors, emergency lights, excitation switchgear, and additional plant control and instrumentation loads. Each distribution panel is provided with supply and feeder circuit breakers or fuses. These devices provide coordinated overcurrent and short circuit protection for the specific load or feeder.

The manual transfer switches provide diversity to the critical dc distribution system loads by allowing the critical loads to be transferred from one dc distribution system train to the other.

The system boundary begins at the batteries and battery chargers and extends to the main distribution panels and local distribution panels.

All CQE electrical components within the 125 VDC System have been evaluated as within the license renewal boundary with the exception of panels and cables and connectors. Panels are evaluated with component supports (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

More information about 125 VDC System can be found in USAR Section 8.3.4.

No components in the 125 VDC System license renewal boundary are subject to aging management review.

2.5.10 120 VAC

The 120 VAC System is composed of six separate buses, four of which supply power to CQE instrumentation. Each instrument bus is supplied by a separate solid-state inverter, which is fed from the direct current (dc) system. The 120 VAC Instrument System is designed to function without interruption in the event of the design basis accident or adverse environmental conditions.

The 120 VAC System includes four CQE and two Non-CQE related inverters and associated buses and transformers. Also included in this system are undervoltage relays, fuses, circuit breakers, indicating lights, fans, switches, ammeters, voltmeters and other attendant instrumentation.

All CQE electrical components within the 120 VAC Instrument System have been evaluated as within the license renewal boundary with the exception of the undervoltage relay (27-1/1A4) that monitors the voltage on 4160 VAC bus 1A4, panels, buses, and cables and connectors. For license renewal purposes, relay 27-1/1A4 is considered part of the 4160 VAC system and was evaluated with that system (application Section 2.5.6). Panels

are evaluated with component supports (application Section 2.4.2.6). Buses were identified as commodity group and are evaluated separately (application Section 2.5.20). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

More information about the 120 VAC Instrument System can be found in USAR Section 8.3.5.

No components in the 120 VAC Instrument System license renewal boundary are subject to aging management review.

2.5.11 PLANT COMPUTER

The Plant Computer (PC) and the Emergency Response Facility (ERF) computer are portions of the same machine. For license renewal application purposes, this evaluation of the Plant Computer includes the ERF Computer.

The Plant Computer provides the normal plant computer functions as well as the ERF and Safety Parameter Display System (SPDS) functions. The Plant Computer is used to monitor and log plant parameters and equipment status. The Plant Computer also performs some secondary plant performance calculations and provides the primary SPDS.

The Plant Computer is a real-time digital computer which collects and organizes plant data for reference and display in the control room, in the Emergency Operations Facility (EOF) and in the Technical Support Center (TSC). The Plant Computer is designed with certain peripheral equipment, memory, and communications links for the automatic switchover to the standby CPU in the event the primary CPU fails.

The front end signal gathering and conditioning subsystem, referred to as the Data Acquisition System (DAS), is located in the plant computer room, adjacent to the main control room. The DAS interfaces with the various plant sensors and with the Qualified Safety Parameter Display System (QSPDS).

The Plant Computer is also comprised of various peripheral equipment. The safety parameter display of sensor signals is provided by the Plant Computer along with meteorological and radiological data. In addition to serving as the primary SPDS, the Plant Computer monitors and logs plant parameters and equipment status and performs secondary plant performance calculations.

All CQE electrical components within the Plant Computer have been evaluated as being within the license renewal boundary with the exception of cables and connectors. Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about the Plant Computer can be found in USAR Section 7.5.5.

No components in the Plant Computer license renewal boundary are subject to aging management review.

2.5.12 QUALIFIED SAFETY PARAMETER DISPLAY

The Qualified Safety Parameter Display System (QSPDS) includes instrumentation to detect the approach to, existence of, and recovery from an inadequate core cooling situation. This system includes upgraded core exit thermocouples, heated junction thermocouple probes for reactor vessel level indication, associated cabling, and the QSPDS microprocessors and displays. The QSPDS also uses wide range temperature signals and a pressurizer pressure signal to calculate subcooled margin.

The system utilizes a micro-processor based design for the signal processing equipment in conjunction with a display having alphanumeric representation and associated keyboard for each of the two channels. Each channel accepts and processes input parameter signals and transmits its output to the plasma display unit, an alphanumeric display device. In addition, each channel transmits its output to the Emergency Response Facility (ERF) computer system.

The QSPDS boundary consists of micro-processors, input modules for signal conditioning and various supportive equipment such as power supplies and communications modules.

All CQE electrical components within QSPDS have been evaluated as within the license renewal boundary with the exception of panels and cables and connectors. Panels were incorporated into the Component Supports commodity group and are evaluated separately (Section 2.4.2.6). Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about the Qualified Safety Parameter Display System can be found in USAR Section 7.5.

No components in the Qualified Safety Parameter Display System license renewal boundary are subject to aging management review.

2.5.13 RADIATION MONITORING

Permanently installed radiation monitors are provided for surveillance of plant effluents and critical process streams (process monitors), and personnel exposure levels in hazardous and potentially hazardous plant areas (area monitors). Monitoring and recording is required for liquid and gaseous releases. Process monitors measure Reactor Coolant System (RCS) and balance of plant leakage.

Two independently adjustable setpoints are provided for each monitor. The lower setpoint alarm warns that the dose rate has reached an abnormal value. The upper setpoint alarm warns that the dose rate has reached or passed the permissible limit. The local indicator, as well as the Control Room indicator and recorder, indicates the actual dose rate at the detector location. Signals for two Containment Radiation High Signal (CRHS) trains are derived on a one-out-of-two basis from separate contact outputs from the containment and stack radiation monitors.

The Radiation Monitoring System includes circuit breakers, relays, controllers, transmitters, radiation detectors and miscellaneous electronic components to monitor, log and alarm radiation levels throughout the plant.

All CQE electrical components within the Radiation Monitoring System have been considered and have been evaluated as in the license renewal boundary with the exception of RE-053 (radiation sampler for the component cooling water system), selected radiation detectors, flow elements, terminal blocks, valves, junction boxes, panels, tubing, sample pumps, and cables and connectors. RE-053 was transferred to the Component Cooling Water System (application Section 2.3.3.6). The selected radiation detectors and flow elements, valves, tubing and sample pumps are evaluated in Radiation Monitoring - Mechanical (application Section 2.3.3.16). Terminal blocks were incorporated into the cables and connectors commodity group (application Section 2.5.1). Panels and junction boxes were incorporated into the Component Supports commodity group and are evaluated separately (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about Radiation Monitoring System can be found in USAR Section 11.2.3.

No components in the Radiation Monitoring System license renewal boundary are subject to aging management review.

2.5.14 ELECTRICAL EQUIPMENT

The Electrical Equipment System is a "generic" system that contains a variety of components that do not fit cleanly in other systems. These components include types such as circuit breakers, switches, relays, indicators, recorders, outlet boxes, instruments, indicating lights, isolators, controllers, test rigs, annunciators, cabinets, operators, turnstiles, inverters, heat tracing, transformers, cooling units, motors, washers, dryers, shop equipment, tanks, panels, generators, batteries, battery chargers, junction boxes, welding receptacles, pumps, and cabinets.

The Electrical Equipment System license renewal boundary includes two switches for testing lockout relays 86-1/SVG1 and 86-2/SVG1 and a controller for fire door 1007-1B.

All CQE electrical components within the Electrical Equipment System have been considered and have been evaluated as in the license renewal boundary with the exception of buses, cable trays, junction boxes, panels, miscellaneous relays, switches, annunciator equipment, contactors, transducers, transformers, indicators, recorders, breakers, motors, blowers, fans, meters, thermocouples, isolation devices, converters, lights, and cables and connectors. Buses were identified as a commodity group and are evaluated separately (application Section 2.5.20). Cable trays, junction boxes and panels were incorporated into the Component Supports commodity group and are evaluated separately (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1). The remaining components, which required no aging management review, were transferred to the various systems with which they were best associated and were evaluated as part of those systems. These systems include Engineered Safeguards, Control Board, Communications, Emergency Diesel Generator, 480 VAC Bus, 480 VAC MCC, 125 VDC, Containment Electrical Penetrations, Fire Protection, Feedwater and Plant Computer-Emergency Response Facility Computer.

No components in the Electrical Equipment System license renewal boundary are subject to aging management review.

2.5.15 AUXILIARY INSTRUMENT PANEL

The Auxiliary Instrument Panel System consists of panels which provide comprehensive control and indication of the availability and operating status of engineered safeguards equipment, power supplies, and automatic control systems.

The Auxiliary Instrument Panel System contains annunciators, circuit breakers, relays, transformers, electrical components and switches located on various panels including the alternate shutdown panel.

All CQE electrical components within the Auxiliary Instrument Panel System have been considered and have been evaluated as in the license renewal boundary with the exception of panels and cables and connectors. Panels are evaluated with component supports (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

No components in the Auxiliary Instrument Panel System license renewal boundary are subject to aging management review.

2.5.16 CONTROL BOARD

The Control Board System consists of the main control board. The main control board is a duplex bench board containing visible alarms with audible signals located on the main control board superstructure to annunciate and identify abnormal operating conditions.

The main control board includes the following panels: reactor plant and auxiliaries, reactivity control, steam plant and turbine, and electrical control. In particular, located on the center of the main control board is the reactivity control panel. The primary and secondary control element assembly position indicators are here, along with the control element drive mechanism controls. Controls for boric acid concentration are also located on this panel. The Control Board System consists of annunciators, electrical connectors, and instruments located on various panels.

All CQE electrical components within the Control Board System have been considered and have been evaluated as in the license renewal boundary with the exception of panels and cables and connectors. Panels are evaluated with component supports (application Section 2.4.2.6). Cables and connectors are evaluated as a commodity group and are evaluated separately (application Section 2.5.1).

More information about the Control Board System can be found in USAR Section 7.6.

No components in the Control Board System license renewal boundary are subject to aging management review.

2.5.17 DIVERSE SCRAM SYSTEM

The Diverse Scram System (DSS) has been designed and installed to meet the requirements of 10 CFR 50.62, the Anticipated Transient Without Scram (ATWS) Rule. The DSS augments the protective function of the Reactor Protection System by providing an independent means of initiating a reactor trip. The DSS uses components that are diverse, independent, and separate from the Reactor Protection System to initiate a reactor trip for anticipated operational occurrences that result in an overpressurization of the Reactor Coolant System. The DSS introduces diversity into the Reactor Protection System, thereby reducing the probability of overpressurizing the Reactor Coolant System from an ATWS event.

The DSS monitors pressurizer pressure with four independent instrument loops, each consisting of a pressure transmitter and a bistable trip unit. The bistable trip unit contacts are configured into two independent two-out-of-four logic matrices. Each matrix has a lockout relay which, when energized, deenergizes the undervoltage trip coils on the reactor trip breakers.

The DSS includes actuating relays, blocking relays, indicating lights, alarm logic, pressure sensors, power supplies, and miscellaneous electronic components and switches to initiate a reactor trip signal when the pressurizer pressure exceeds a predetermined value.

All CQE electrical components within the DSS have been evaluated as within the license renewal boundary with the exception of cables and connectors. Cables and Connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

More information about the Diverse Scram System can be found in USAR Section 7.2.11.

No components in the Diverse Scram System license renewal boundary are subject to aging management review.

2.5.18 COMMUNICATIONS

The Communications and the Gaitronics systems provide a means to communicate throughout the station and off site. For this section, the term "Communications" includes the Gaitronics system. There is no separate section for the Gaitronics system.

All CQE electrical components within the Communications System have been considered and have been evaluated as in the license renewal boundary with the exception of panels and cables and connectors. Panels are evaluated with component supports (application Section 2.4.2.6). In addition, cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

No components in the Communications System license renewal boundary are subject to aging management review.

2.5.19 EMERGENCY LIGHTING

The Emergency Lighting System provides lighting, associated batteries, and equipment to various areas such as the maintenance shop, the control room, the cafeteria, etc. Certain lighting fixtures are operated from both AC and DC voltage sources. Upon loss of normal AC source, these fixtures are transferred to a DC power source. Other critical locations such as the Auxiliary Building and control room are provided with DC lights which provide sufficient illumination for plant safe shutdown.

The AC-DC lights are located in stairways, hallways, and entryways, to provide safe illumination during normal and emergency lighting conditions. These incandescent lights are supplied with normal AC power. On loss of AC power an automatic transfer switch will activate to provide a DC source for these panels. The DC lights are located in strategic locations throughout the Auxiliary Building, such as the control room and switchgear room, to provide safe illumination for control of the plant during loss of normal lighting.

All CQE electrical components within the Emergency Lighting system have been evaluated as being within the license renewal boundary with the exception of cables and connectors. Cables and connectors are evaluated as a commodity group for the entire plant (application Section 2.5.1).

No components in the Emergency Lighting System license renewal boundary are subject to aging management review.

2.5.20 BUS BARS

The components evaluated in this section of the application encompass the passive, long-lived electrical buses and their associated standoffs which support an intended function as defined by 10 CFR Part 54.21(a)(1)(i). Electrical buses perform the function of electrically connecting specified sections of an electrical circuit to deliver voltage, current (either continuously or intermittently) to various equipment and components throughout the plant to enable them to perform their intended functions. The intended function of the standoffs is to support the electrical bus bars. There are no electrical buses or associated standoffs in the scope of license renewal that are included in the 10 CFR 50.49 program (Environmental Qualification).

The Electrical Bus Bar component types subject to aging management review and their intended functions are shown in Table 2.5.20-1.

TABLE 2.5.20-1
BUS BARS
Component Types Subject to Aging Management Review and Intended Functions

Component Type	Intended Functions
Electrical Bus Bar	Electrical Continuity
Electrical Bus Bar Standoff	Component Support

2.6 REFERENCES

2.1-1 NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Revision 3,* March 2001

2.1-2 FCS USAR, Appendix N, Revision 3

2.1-3 Letter from NRC to NEI, "License Renewal Issue No. 98-0082, Scoping Guidance," August 5, 1999

2.1-4 NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*, published July 2001

2.1-5 Letter from Baltimore Gas and Electric Company to NRC, Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, Docket Nos. 50-317 and 50-318 Application for License Renewal, April 8, 1998

2.1-6 Letter from Duke Power Company to NRC, Oconee Nuclear Station, Units 1, 2 and 3, Docket Nos. 50-269, 50-270 and 50-287 Application for Renewal Operating Licenses, July 6, 1998

2.1-7 Letter from NRC to NEI, "Determination of Aging Management Review for Electrical Components," September 19, 1997

2.1-8 Letter from NRC to NEI, "License Renewal Issue No. 98-0012, Consumables," April 20, 1999

2.1-9 Letter from NRC to NEI, "License Renewal Issue No. 98-0016, Aging Management Review of Fuses," April 27, 1999

2.1-10 *Federal Register*, Vol. 60, No. 88, pp. 22461, May 8, 1995, as amended at Vol. 61, pp. 65175, December 11, 1996 and Vol. 64, pp. 72002, December 23, 1999, "Nuclear Power Plant License Renewal; Revisions" [NRC Statements of Consideration for 10 CFR Parts 2, 51, and 54]

2.3-1 NUREG-1705, *Safety Evaluation Report Related to the License Renewal of Calvert Cliffs Nuclear Power Plant, Units 1 and 2*, December 1999

2.3-2 10 CFR 50, Appendix R, *Fire Protection Program for Nculear Power Facilities Operating Prior to January 1, 1979*

2.3-3 BTP APCSB 9.5-1, *Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976*