NUREG-1796

Safety Evaluation Report
Related to the License Renewal of the Dresden Nuclear Power Station, Units 2 and 3 and Quad Cities Nuclear Power Station, Units 1 and 2

Docket Nos. 50-237, 50-249, 50-254, and 50-265

Exelon Generation Company, LLC (Exelon)

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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Exelon Generation Company, LLC (Exelon)

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ABSTRACT

This safety evaluation report (SER) documents the technical review of the Dresden Nuclear Power Station (DNPS), Units 2 and 3 and Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2, license renewal application (LRA) by the U.S. Nuclear Regulatory Commission (NRC) staff (staff). By letter dated January 3, 2003, Exelon Generation Company (Exelon or the applicant) submitted the LRA for Dresden and Quad Cities (D/QCNPS) in accordance with Title 10, Part 54 of the *Code of Federal Regulations* (10 CFR Part 54 or the Rule). Exelon requests renewal of the operating licenses for DNPS Unit 2 (License No. DRP-19), DNPS Unit 3 (License No. DRP-25), QCNPS Unit 1 (License No. DRP-29), and QCNPS Unit 2 (License No. DRP-30) for a period of 20 years beyond the current license expirations of midnight, December 22, 2009; January 12, 2011; December 14, 2012; and December 14, 2012, respectively.

DNPS is located in Grundy County, Illinois, on the shore of a man-made cooling lake, with the Illinois River to the north and the Kankakee River to the east. The QCNPS is located in Rock Island County, IL, on the east bank of the Mississippi River opposite the mouth of the Wapsipinicon River, and about 3 miles north of Cordova, IL. DNPS, Units 1 and 2, and QCNPS, Units 2 and 3, each consist of a General Electric boiling-water reactor (BWR/3) authorized to operate individually at a steady state reactor power level not to exceed 2957 megawatts-thermal, or approximately 850 megawatts-electric.

This SER presents the status of the staff's review of information submitted to the NRC through June 22, 2004, the cutoff date for consideration in the SER. The staff identified open items and confirmatory items that had to be resolved before the staff could make a final determination on the application. Sections 1.5 and 1.6 of this report summarize these items and their resolutions. Section 6 provides the staff's final conclusion of its review of the D/QCNPS LRA.

The NRC license renewal project manager is Mr. Rajender Auluck. Mr. Auluck may be reached at (301) 415-1025. Written correspondence should be addressed to the License Renewal and Environmental Impacts Program, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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ABBREVIATIONS

A	ampacity
AC	alternating current
ACAD	atmospheric containment air dilution system
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
ACSR	aluminum conductor steel reinforced
ADAMS	Agencywide Document Access and Management System
ADS	Automatic depressurization system
AEC	Atomic Energy Commission
AERM	aging effect requiring management
AFW	auxiliary feedwater
AFU	air filtration unit
AHU	air handling unit
AISC	American Institute of Steel Construction
ALARA	as low as reasonably achievable
AMG	aging management guideline
AMP	aging management program
AMR	aging management review
AMSAC	ATWS mitigation system actuation circuitry
ANS	American Nuclear Society
ANSI	American National Standards Institute
AOR	abnormal occurrence report
APCSB	Auxiliary and Power Conversion System Branch
AR	action report
ARI	alternate rod insertion
ART	adjusted reference temperature
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without a scram
AVT	all-volatile treatment
AWG	American wire gauge
BMI	bottom mounted instrument
BTP	branch technical position
B&W	Babcock and Wilcox
BWR	boiling-water reactor
BWROG	Boiling Water Reactor Owners Group
BWRVIP	Boiling Water Reactor Vessel and Internals Project
C	Celsius
CAM	containment atmospheric monitoring
CAR	corrective action report
CASS	cast austenitic stainless steel
CBF	cycle-based fatigue
CCST	contaminated condensate storage tank

CCSW	containment cooling service water
CCW	component cooling water
CDF	core damage frequency
CDHR c	ontainer hydrogen detectors and recombiner
CD-ROM	compact disk-read only memory
CDWST	clean demineralized water storage tank
CF	chemistry factor
CFR	*Code of Federal Regulations*
CI	confirmatory item
CIC	contaminant isolation component
CLB	current licensing basis
CMAA	Crane Manufactures Association of America
CO	carbon monoxide
CO_2	carbon dioxide
ComEd	Commonwealth Edison
C-RAI	clarification of request for additional information
CRD	control rod drive
CRDA	control rod drop accident
CRD(H)	control rod drive (hydraulic)
CRDM	control rod drive mechanism
CR HVAC	air handles heating/cooling
CS	containment spray system or carbon steel
CST	condensate storage tank
CUF	cumulative usage factor
CV	check valve
CW	circulating water
D/QCNPS	Dresden/Quad Cities Nuclear Power Station
DAM	data acquisition modules
DBA	design-basis accident
DBD	design baseline document
DBE	design-basis event
DC	direct current
DFO	diesel fuel oil
DG	diesel generator
DGB-HVAC	diesel generator building heating, ventilation, and air conditioning
DGCW	diesel generator cooling water
DGSW	diesel generator service water
DNI	drywell nitrogen inerting
DNPIS	drywell nitrogen purge and inerting system
DNPS	Dresden Nuclear Power Station
DPR	developmental power reactor
DR	drywell-to-refueling
D-RAI	draft request for additional information
DRS	development requirements specification
DSER	draft safety evaluation report
DWM	demineralizer water makeup
EC	engineering change

ECCS	emergency core cooling system
ECP	electrochemical corrosion potential
ECR-HVAC	emergency core cooling system corner room heating, ventilation, and air conditioning
EDG	emergency diesel generator
EDY	effective degradation years
EFPY	effective full-power year
EFWST	emergency feedwater storage tank
EGC	Exelon Generation Company, LLC
EHC	electrohydraulic control
EMA	equivalent margin analysis
EPN	equipment part number
EPR	ethylene propylene rubber
EPRI	Electric Power Research Institute
EPU	extended power uprate
EQ	environmental qualification
ESF	engineered safety features
ESS	electronic switching system
ESW	electroslag weld
EWCS	electronic work control system
F	Fahrenheit
FAC	flow-accelerated corrosion
FCC	Federal Communications Commission
F_{en}	environmental fatigue multiplier
FERC	Federal Energy Regulatory Commission
FOI	factor of improvement
FP	fire protection
FPP	fire protection program
FRP	fiberglass reinforced plastic
FSAR	final safety analysis report
FSER	final safety evaluation report
FSSD	fire safe shutdown
ft	foot, feet
ft-lb	foot-pound
FWRV	feedwater regulating valve
GALL	Generic Aging Lessons Learned (Report)
GE	General Electric
GEIS	generic environmental impact statement
GL	generic letter
GSI	generic safety issue
GTR	generic technical report
HCU	hydraulic control unit
HELB	high energy line break
HEPA	high efficiency particulate air

HIC	high integrity container
HPCI	high pressure coolant injection system
HRRM	high-range radiation monitor
HRSS	high radiation sampling system
HSLAS	high strength low alloy steel
HSO	hydrogen seal oil
HTK	high temperature kerite
HVAC	heating, ventilation, and air conditioning
HWC	hydrogren water chemistry
HX	heat exchanger
I&C	instrumentation and control
IA	instrument air
IASCC	irradiation-assisted stress-corrosion cracking
ID	inner diameter
IDR	inspection discrepancy report
IE	Inspection and Enforcement, Office of (NRC)
IEB	inspection and enforcement bulletin
IGA	intergranular attack
IGSCC	intergranular stress-corrosion cracking
IHSI	induction heat stress improvement
ILRT	integrated leak rate test
in.	inch, inches
IN	information notice
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
IR	insulation resistance
IRM	intermediate range monitor
ISG	interim staff guidance
ISI	inservice inspection
ISP	Integrated Surveillance Program
IST	inservice testing
J	joule
K_{eff}	effective multiplication factor
Kip	one thousand pounds
KV	kilovolt
LBB	leak before break
LER	licensee event report
LLRT	local leak rate test
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LPCI	low pressure coolant injection system
LPRM	local power range monitor

LR	license renewal
LRA	license renewal application
LRTI	license renewal technical instruction
LTOP	low-temperature over-pressurization
LWR	light water reactor
m	margin
M/G	motor generator
MCC	motor control center
MeV	one million electron volts
MG	motor generator
MIC	microbiologically influenced corrosion
mil/y	mils per year
MOV	motor-operated valve
MRV	minimum required value
MSIP	mechanical stress improvement method
MSIV	main steam isolation valve
MSL	mean sea level
MSV	main stop valve
MSIV	main steam isolation valve
MT	magnetic particle test
MWe	megawatt-electric
NACE	National Association of Corrosion Engineers
NaOH	sodium hydroxide
NBI	nuclear boiler instrumentation
NCAD	nitrogen containment atmospheric dilution
NCR	nonconformance report
NDE	nondestructive examination
ND-QAP	Quality Assurance Program for Station Operation
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act of 1969
NFPA	National Fire Protection Association
NIS	nuclear instrumentation system
NMCA	noble metal chemical application
NNS	non-nuclear safety
NPAR	nuclear plant aging research
NPS	nominal pipe size
NPSH	net positive suction head
NRC	U.S. Nuclear Regulatory Commission
NSR	non-safety-related
NSSS	nuclear steam supply system
NUMARC	Nuclear Management and Resources Council (now NEI)
NUREG	Nuclear Regulatory Commission technical report
NUREG/CR	NUREG contractor report

OBE	operating based event
OD	outside diameter
OE	operating experience
ODSCC	outside diameter stress-corrosion cracking
OI	open item
OPT	operability test
P(F/E)	Conditional failure probability
P&I	piping and instrumentation
P&ID	piping and instrumentation diagram
PC	primary containment
PCIS	primary containment isolation system
PDT	piping design table
PLL	predicted lower limit
PM	preventive maintenance
PMT	post-maintenance test
PORV	power operated relief valve
ppm	parts per million
PS	process sampling
psi	pounds per square inch
psig	pounds per square inch gauge
PT	penetrant test
P-T	pressure-temperature
PTS	pressurized thermal shock
PUAR	plant-unique analysis reports
PVC	polyvinyl chloride
PWHT	postweld heat treatment
PWR	pressurized-water reactor
QA	quality assurance
QAP	quality action plan
QCNPS	Quad Cities Nuclear Power Station
RAI	request for additional information
RAT	reserve auxiliary transformer
RBCCW	reactor building closed cooling water
RBH-HVAC	reactor building heating, ventilation, and air conditioning
RCCA	rod cluster control assembly
RCIC	reactor core isolation cooling
RCP	reactor coolant pump
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RCU	refrigeration condensing unit
RFP	reactor feed pump
RG	regulatory guide
RHR	residual heat removal

1. INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This document is a safety evaluation report (SER) on the application to renew the operating licenses for the Dresden Nuclear Power Station (DNPS), Units 2 and 3, and Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2, as filed by Exelon Generation Company (EGC or the applicant). By letter dated January 3, 2003, EGC submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for renewal of the DNPS and QCNPS operating licenses for up to an additional 20 years. The NRC received the application on January 3, 2003. The NRC staff (the staff) reviewed the DNPS/QCNPS license renewal application (LRA) for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared this report to document the results of its safety review. The NRC license renewal project managers for the DNPS and QCNPS safety review are Mr. Rajender Auluck and Mr. T. J. Kim. Mr. Auluck may be contacted by telephone at (301) 415-1025 or by electronic mail at RCA@nrc.gov. Alternatively, written correspondence can be sent to the following address:

License Renewal and Environmental Impacts Program
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attention: R. Auluck, Mail Stop O-11F1

In its January 3, 2003, submittal letter, the applicant requested renewal of the operating licenses issued under Section 104b of the Atomic Energy Act of 1954, as amended, for DNPS Unit 2 (License No. DPR-19), DNPS Unit 3 (License No. DPR-25), QCNPS Unit 1 (License No. DPR-29), and QCNPS Unit 2 (License No. DPR-30) for a period of 20 years beyond the current license expirations of midnight, December 22, 2009, January 12, 2011, December 14, 2012, and December 14, 2012, respectively. The DNPS is located in Grundy County, Illinois, on the shore of a man-made cooling lake, with the Illinois River to the north and the Kankakee River to the east. The QCNPS is located in Rock Island County, Illinois, on the east bank of the Mississippi River opposite the mouth of the Wapsipinicon River, and about 3 miles north of Cordova, Illinois. Units 2 and 3 of the DNPS and Units 1 and 2 of the QCNPS each consist of a General Electric boiling-water reactor (BWR/3) authorized to individually operate at a steady-state reactor power level not to exceed 2957 megawatts-thermal, or approximately 850 megawatts-electric. Details concerning the plant and the site are found in the updated final safety analysis report (UFSAR) for DNPS/QCNPS.

The license renewal process proceeds along two tracks, which include both a technical review of safety issues and an environmental review. The requirements for these two reviews are specified in NRC regulations 10 CFR Parts 54 and 51, respectively. The safety review for the DNPS and QCNPS license renewals is based on the applicant's LRA, docketed correspondence, and the answers to requests for additional information (RAIs) from the NRC staff. In meetings and docketed correspondence, the applicant has also supplemented its answers to the RAIs. Unless otherwise noted, the staff reviewed and considered information submitted through June 22, 2004. The public can review the LRA and all pertinent information and material, including the UFSAR, at the NRC Public Document Room, 11555 Rockville Pike, Rockville, Maryland 20852-2738. In addition, the DNPS/QCNPS LRA and significant information and material related to the license renewal review are available on the NRC's web page at http://www.nrc.gov

This SER summarizes the findings of the staff's safety review of the DNPS/QCNPS LRA and delineates the scope of the technical details considered in evaluating the safety aspects of the proposed operation of the plants for up to an additional 20 years beyond the term of the current operating licenses. The staff reviewed the LRA in accordance with NRC regulations and the guidance presented in NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), which the NRC issued in July 2001.

Sections 2 through 4 of the SER document the staff's review and evaluation of license renewal issues that it considered during the review of the LRA. Section 5 is reserved for the report of the Advisory Committee on Reactor Safeguards (ACRS). The conclusions of this report are in Section 6 of the SER.

Appendix A is a list of commitments made by EGC. Appendix B is a chronology of the principal correspondence between the NRC and the applicant related to the review of the LRA. Appendix C is a list of the principal NRC staff reviewers and its contractors for this project. Appendix D is a list of the major references used in support of this SER.

In accordance with 10 CFR Part 51, the staff prepared plant-specific supplements to the generic environmental impact statement (GEIS). These supplements discuss the environmental considerations related to renewing the licenses for DNPS and QCNPS. The plant-specific supplements to the GEIS were issued separately. The NRC staff issued Supplement 17 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding the Dresden Nuclear Power Station, Units 2 and 3," on June 29, 2004, and Supplement 16 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding the Quad Cities Nuclear Power Station, Units 1 and 2," on June 30, 2004.

1.2 License Renewal Background

Pursuant to the Atomic Energy Act of 1954, as amended, and NRC regulations, operating licenses for commercial power reactors are issued for up to 40 years. These licenses can be renewed for up to 20 additional years. The original 40-year license term was selected on the basis of economic and antitrust considerations, rather than on technical limitations. However, some individual plant and equipment designs may have been engineered on the basis of an expected 40-year service life.

In 1982, the NRC anticipated interest in license renewal and held a workshop on nuclear power plant aging. The NRC team then established a comprehensive program plan for nuclear plant aging research (NPAR). On the basis of the results of that research, a technical review group concluded that many aging phenomena are readily manageable and do not pose technical issues that would preclude extending the life of nuclear power plants. In 1986, the NRC published a request for comment on a policy statement that would address major policy, technical, and procedural issues related to license renewal for nuclear power plants.

In 1991, the NRC published the license renewal rule in 10 CFR Part 54 (the Rule). The NRC participated in an industry-sponsored demonstration program to apply the Rule to a pilot plant and develop experience to create implementation guidance. To establish a scope of review for license renewal, the Rule defined age-related degradation unique to license renewal. However, during the demonstration program, the NRC found that many aging mechanisms occur and are managed during the period of the initial license. In addition, the NRC found that the scope of the review did not allow sufficient credit for existing aging management programs (AMPs), particularly for the implementation of the Maintenance Rule (10 CFR 50.65), which also manages plant aging phenomena.

As a result, in 1995, the NRC amended 10 CFR Part 54. The amended license renewal rule establishes a regulatory process that is simpler, more stable, and more predictable than the previous license renewal rule. In particular, 10 CFR Part 54 was amended to focus on managing the adverse effects of aging rather than on identifying age-related degradation unique to license renewal. The Rule changes were intended to ensure that important systems, structures, and components (SSCs) within the scope of the Rule will continue to perform their intended functions during the period of extended operation. In addition, the integrated plant assessment (IPA) process was clarified and simplified to be consistent with the revised focus on passive, long-lived structures and components (SCs).

In parallel with these efforts, the NRC pursued a separate rulemaking effort to amend 10 CFR Part 51 to focus the scope of the review of environmental impacts of license renewal and to fulfill, in part, the NRC's responsibilities under the National Environmental Policy Act of 1969 (NEPA).

1.2.1 Safety Reviews

License renewal requirements for power reactors are based on two principles:

(1) The regulatory process is adequate to ensure that the licensing bases of all currently operating plants provide and maintain an acceptable level of safety, with the possible exception of the detrimental effects of aging on the functionality of certain SSCs during the period of extended operation, as well as a few other safety-related issues.

(2) The plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term.

In implementing these two principles, 10 CFR 54.4 defines the scope of license renewal as including those plant SSCs (1) that are safety-related, (2) whose failure could affect safety-related functions, and (3) that are relied on to demonstrate compliance with the NRC's regulations for fire protection, environmental qualification (EQ), pressurized thermal shock (PTS), anticipated transients without scram (ATWS), and station blackout (SBO).

Pursuant to 10 CFR 54.21(a), the applicant for a license renewal must review all SSCs that are within the scope of the Rule to identify SCs that are subject to an aging management review (AMR). The SCs that are subject to an AMR are those that perform an intended function without moving parts, or without a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period. As required by

10 CFR 54.21(a)(3), an applicant for a license renewal must demonstrate that the effects of aging will be managed in such a way that the intended function or functions of the SCs that are within the scope of license renewal will be maintained, consistent with the current licensing basis (CLB), for the period of extended operation. Active equipment, however, is considered to be adequately monitored and maintained by existing programs. In other words, the detrimental effects of aging that may affect active equipment are more readily detectable and will be identified and corrected through routine surveillance, performance monitoring, and maintenance activities. The surveillance and maintenance programs for active equipment, as well as other aspects of maintaining the plant design and licensing basis, are required to continue throughout the period of extended operation.

Pursuant to 10 CFR 54.21(d), the LRA is required to include a supplement to the updated final safety analysis report (UFSAR). This UFSAR Supplement must contain a summary description of the applicant's programs and activities for managing the effects of aging.

Another requirement for license renewal is the identification and updating of time-limited aging analyses (TLAAs). During the design phase for a plant, certain assumptions are made about the initial length of time the plant will be operated, and these assumptions are incorporated into design calculations for several of the plant's SSCs. In accordance with 10 CFR 54.21(c)(1), these calculations must be shown to be valid for the period of extended operation or must be projected to the end of the period of extended operation, or the applicant must demonstrate that the effects of aging on these SSCs will be adequately managed for the period of extended operation.

In July 2001, the NRC issued Regulatory Guide (RG) 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses"; NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR); and NUREG-1801, "Generic Aging Lessons Learned (GALL) Report." These documents describe methods acceptable to the NRC staff for implementing the license renewal rule and techniques used by the NRC staff in evaluating applications for license renewal. The RG endorses an implementation guideline prepared by the Nuclear Energy Institute (NEI) as an acceptable method of implementing the license renewal rule. The NEI guideline, NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54—The License Renewal Rule," Revision 3, was issued in March 2001.

Exelon Generation Company is the fifth license renewal applicant to fully utilize the process defined in NUREG-1801, otherwise known as the GALL Report. The purpose of the GALL Report is to provide the staff with a summary of staff-approved AMPs for the aging of most SCs that are subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA will be greatly reduced, thereby improving the efficiency and effectiveness of the license renewal review process. The GALL Report summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used throughout the industry. The report also serves as a reference for both applicants and staff reviewers to quickly identify those AMPs and activities that the staff has determined will provide adequate aging management during the period of extended operation.

1.2.2 Environmental Reviews

In December 1996, the staff revised the environmental protection regulations in 10 CFR Part 51 to facilitate environmental reviews for license renewal. The staff prepared the "Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants" (NUREG-1437, Revision 1) to document its evaluation of the possible environmental impacts associated with renewing licenses of nuclear power plants. For certain types of environmental impacts, the GEIS establishes generic findings that are applicable to all nuclear power plants. These generic findings are identified as Category 1 issues in Subpart A of Appendix B to 10 CFR Part 51. Pursuant to 10 CFR 51.53(c)(3)(i), an applicant for license renewal may incorporate these generic findings in its environmental report. Analyses of the environmental impacts of license renewal that must be evaluated on a plant-specific basis (i.e., Category 2 issues) must be included in an environmental report in accordance with 10 CFR 51.53(c)(3)(ii).

In accordance with NEPA and the requirements of 10 CFR Part 51, the NRC performed a plant-specific review of the environmental impacts of license renewal, including whether new and significant information was not considered in the GEIS. Two public meetings were held, one near QCNPS on December 16, 2003, and one near DNPS on January 14, 2004, as part of the NRC's scoping process to identify environmental issues specific to each plant. The results of the environmental reviews and recommendations on the license renewal actions are documented in the NRC plant-specific Supplements 16 and 17 to the GEIS, which were issued on June 30, 2004 and June 29, 2004, for QCNPS and DNPS, respectively.

1.3 Principal Review Matters

The requirements for renewing operating licenses for nuclear power plants are described in 10 CFR Part 54. The staff performed its technical review of the DNPS/QCNPS LRA in accordance with Commission guidance and the requirements of 10 CFR Part 54. The standards for renewing a license are contained in 10 CFR 54.29. This SER describes the results of the staff's safety review.

In 10 CFR 54.19(a), the Commission requires a license renewal applicant to submit general information. The applicant provided this general information in Chapter 1 of its LRA for DNPS/QCNPS, submitted by letter dated January 3, 2003. The staff finds that the applicant has submitted the information required by 10 CFR 54.19(a) in Section 1 of the LRA.

In 10 CFR 54.19(b), the Commission requires that license renewal applications (LRAs) 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 applicant stated the following in Section 1.1.10 of its LRA regarding this issue:

> The current indemnity agreement for Dresden and Quad Cities state in Article VII that the agreement shall terminate at the time of expiration of the licenses specified in Item 3 of the Attachment to the agreement. Item 3 of the Attachment to the indemnity agreement, lists license numbers, DPR-19, DPR-25, DPR-29, and DPR-30. Applicant requests that any necessary conforming changes be made to Article VII and Item 3 of the Attachment, and any other sections of the indemnity agreement as appropriate to ensure that the indemnity agreement continues to apply during both the terms of the current licenses and the terms of the renewed licenses. Applicant understands that no changes may be necessary for this purpose if the current license numbers for each of the units are retained.

The staff intends to maintain the original license number upon issuance of the renewed license. Therefore, there is no need to make conforming changes to the indemnity agreement, and the requirements of 10 CFR 54.19(b) have been met.

In 10 CFR 54.21, the Commission requires that each LRA for a nuclear facility contain (a) an IPA, (b) CLB changes during staff review of the LRA, (c) an evaluation of TLAAs, and (d) a UFSAR Supplement. Sections 3 and 4 and Sections A and B of the LRA address the license renewal requirements of 10 CFR 54.21(a), (c), and (d), respectively.

In 10 CFR 54.21(b), the Commission requires that each year following submission of the application, and at least 3 months before scheduled completion of the staff's review, an amendment to the renewal application must be submitted that identifies any changes to the CLB of the facility that materially affect the contents of the LRA, including the UFSAR Supplement. The applicant's update to the LRA was issued on March 5, 2004.

In 10 CFR 54.22, the Commission outlines requirements regarding technical specifications. In Appendix D of the LRA, the applicant stated that no technical specification changes had been identified as being necessary to support issuance of the renewed operating licenses for DNPS/QCNPS. This adequately addresses the requirements of 10 CFR 54.22.

The staff evaluated the technical information required by 10 CFR 54.21 and 10 CFR 54.22 in accordance with the NRC's regulations and the guidance provided by the SRP-LR. The staff's evaluation of the LRA in accordance with 10 CFR 54.21 and 10 CFR 54.22 is contained in Sections 2, 3, and 4 of this SER.

The staff's evaluation of the environmental information required by 10 CFR 54.23 is contained in the final plant-specific supplement to the GEIS, which states the considerations related to renewing the licenses for DNPS/QCNPS. This was prepared by the staff separate from this report. The report of the ACRS, required by 10 CFR 54.25, is incorporated into Section 5 of this SER. The findings required by 10 CFR 54.29 can be found in Section 6 of this SER.

1.4 Interim Staff Guidance

The license renewal program is a living program. The staff, industry, and other interested stakeholders gain experience and develop lessons learned with each renewed license. The lessons learned address the Commission's performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence. The lessons learned are captured in interim staff guidance (ISG) for use by the staff and interested stakeholders until the improved license renewal guidance documents are revised.

The current set of relevant ISGs and the SER sections in which the issues are addressed by the staff are provided in the following table.

Interim Staff Guidance for License Renewal		
ISG Issue (Approved ISG No.)	**Purpose**	**SER Section**
Station Blackout (SBO) Scoping (ISG-02)	The license renewal rule 10 CFR 54.4(a)(3) includes 10 CFR 50.63(a)(1)—SBO. The SBO rule requires that a plant must withstand and recover from an SBO event. The recovery time for offsite power is much faster than that of emergency diesel generators (EDG)s. The offsite power system should be included within the scope of license renewal.	2.5.1.5.2 3.5.2.4.2
Concrete Aging Management Program (ISG-03)	Lessons learned from the GALL demonstration project indicated that GALL is not clear whether concrete need an AMP.	3.5.2.2.1 3.5.2.2.2 3.5.2.4.1 3.5.2.4.2
Fire Protection (FP) System Piping (ISG-04)	This ISG clarifies the staff position on wall thinning of FP piping system in GALL AMPs XI.M26 and XI.M27. The new position is that there is no need to disassemble FP piping, as oxygen can be introduced in the FP piping which can accelerate corrosion. Instead, non-intrusive methods such as volumetric inspection should be used. Testing of sprinkler heads should be performed every 50 years and 10 years after initial service. This ISG eliminated Halon/carbon dioxide system inspections for charging pressure, valve line ups, and automatic mode of operation test from GALL. The staff considers these test verifications to be operational activities.	3.3.2.3.2 3.3.2.3.3 3.3.2.4.6
Identification and Treatment of Electrical Fuse Holder (ISG-05)	This ISG includes fuse holder AMR and AMP (i.e., same as terminal blocks and other electrical connections). The position includes only fuse holders that are not inside the enclosure of active components (e.g., inside of switchgears and inverters). Operating experience finds that metallic clamps (spring-loaded clips) have a history of age-related failures from aging stressors such as vibration, thermal cycling, mechanical stress, corrosion, and chemical contamination. The staff finds that visual inspection of fuse clips is not sufficient to detect the aging effects from fatigue, mechanical stress, and vibration.	3.6.2.4.1

1.5 Summary of Open Items

As a result of its review of the LRA for QCNPS and DNPS, including additional information submitted to the NRC through June 22, 2004, the staff identified the following open items. An issue was considered open if the applicant had not presented a sufficient basis for resolution. Each open item (OI) has been assigned a unique identifying number. The items identified in this section have been properly closed by the technical staff.

OI-2.1-1: (Section 2.1.3.1.2 - Application of the Scoping Criteria in 10 CFR 54.4(a)(2))

The staff determined that the applicant did not provide a sufficient basis for limiting consideration of fluid spray interactions to only those non-safety-related SSCs located within 20 feet of an active safety-related SSC. In particular, the staff required additional clarification regarding the capability of active and passive safety-related SSCs located greater than 20 feet from a potential spray source to tolerate wetting, the specific operating experience that was relied upon to determine that it was not credible for fluid sprays to affect equipment greater than 20 feet from a failure location, specific methods to detect leakage in normally accessible and inaccessible areas, and justification for use of exposure duration in limiting the scope of potential failure mechanisms considered during scoping. This issue was identified as Open Item 2.1-1.

The applicant responded to Open Item 2.1-1 by letters dated April 9, 2004 and May 18, 2004 (ADAMS Accession Nos. ML041070456, and ML041480178). In addressing this open item, the applicant revised the scoping methodology for nonsafety-related moderate energy piping systems that have the potential to spatially interact with safety-related systems. Specifically, the applicant eliminated the 20 foot separation criterion and credit for the early detection of leakage that was previously used to exclude certain moderate energy nonsafety-related piping and components from the scope of License Renewal. The revised methodology assumes that all safety-related components, active as well as passive, could be adversely affected by spray or wetting from a non-safety moderate energy system located in the same general area of the plant. Therefore, the applicant stated that all components from moderate energy nonsafety-related systems located in the same general area as a safety-related component (active or passive) would be included within the scope of license renewal. The applicant defined "General area" as the same floor (elevation) of a major building with no barrier walls between the fluid source and the safety-related component. Barrier walls were defined as barriers that form the boundary of a room on the same elevation of a major building separating the safety-related components from a spray or leak generated by a non-safety-related component located on the other side of the barrier wall. The applicant stated that all barrier walls credited for protection of safety-related components were previously included within the scope of license renewal during structural scoping and subject to aging management review.

In accordance with the revised methodology, the applicant expanded the license renewal boundaries of seventeen systems previously determined to be within the scope of license renewal and identified an additional intended function for the main condenser at Quad Cities. Additionally, the applicant added the following five nonsafety-related systems to the scope of license renewal that were previously excluded from the scope of license renewal: circulating water (Dresden and Quad Cities), laundry (Dresden), zinc addition (Dresden and Quad Cities), extraction steam (Quad Cities), and feedwater heater vents and drains (Quad Cities) . In its

May 18, 2004 response to Open Item 2.1-1, the applicant identified LRA revisions, scoping results changes, and aging management program changes required as a result of the scoping methodology revision. The staff review of these revised scoping results and associated aging management programs are described in Sections 2.3 and 3.0.5 of this report.

On the basis of the above, the staff concludes that the applicant adequately resolved the issues identified in Open Item 2.1-1. Specifically, the elimination of the twenty foot limitation on spray interactions, consideration of potential adverse effects for both active and passive safety-related equipment, and elimination of credit for early detection of leakage adequately addressed the staff's methodology concerns. Furthermore, the staff determined that the applicant's revised methodology considered a reasonable spectrum of potential nonsafety-related spatial interactions with safety-related equipment. Therefore, the staff concludes that the revised methodology for scoping nonsafety-related equipment provides reasonable assurance that the applicant considered nonsafety-related SSCs whose failure could prevent satisfactory accomplishment of a safety-related intended function within the scope of license renewal. On this basis, Open Item 2.1-1 is resolved.

<u>OI-3.5.2.3.2-1:</u> (Section 3.5.2.3.2- ASME Section XI, Subsection IWF (B.1.27))

Some of the Class MC supports discussed by the applicant in the RAI responses regarding Class MC supports seemed to be inaccessible. Therefore, the staff needed to better understand how the applicant is treating these supports. This was identified as Open Item 3.5.2.3.2-1.

To resolve the concerns, the staff requested the applicant to provide the following information:

(a) Identify each type of Class MC support by name and confirm whether the support will be inspected under IWF during the period of extended operation. Provide a technical explanation for those supports that are proposed to be inspected under another program (such as IWE or Structures Monitoring) or for cases where no inspection is planned.

(b) Since Class MC supports are not currently being inspected, provide a commitment to perform a baseline inspection of typical samples of each type of Class MC component support prior to the period of extended operation, to identify and correct any problems affecting performance of intended functions.

(c) Describe how the performance of Class MC component supports in inaccessible areas are currently being managed and how they will be managed during the period of extended operation. Clarify the commitment to the provisions of 10 CFR 50.55(a) covering inaccessible areas.

(d) Review the response to RAI 2.4-2 and identify the aging management program applicable to each item (a) through (k). Also verify the consistency of this RAI response with the response to RAI 2.4-10.

The applicant submitted the responses by letter dated April 9, 2004. After reviewing the applicant's responses, the staff accepts the applicant's proposed use of its Structures Monitoring Program as an alternate AMP to the GALL's ASME IWF program for its Class MC piping supports, with the following modifications.

Modification #1 states that the sample size of the Class MC piping supports should be 15% of the support population, as stipulated in Table IWF-2500-1, because the ten sample supports proposed by the applicant were insufficient.

Modification #2 states that the person who performs the inspection should have demonstrated knowledge of inspection attributes on Class MC piping supports and should be under oversight guidance from the administrator or his designee during the initial inspection activity.

Modification #3 states that a baseline inspection should be performed on the sample supports prior to the period of extended operation.

The applicant submitted its revised responses in a letter dated June 22, 2004. The responses satisfactorily resolve the sample size and inspector's qualification issues. However, the staff was not sure whether the applicant intended to only revise its Structures Monitoring Program prior to the period of extended operation or actually have the MC supports and MC piping sample supports inspected prior to the period of extended operation. In a telephone conference on July 13, 2004, the applicant clarified that a baseline inspection would be performed for these supports prior to the period of extended operation. This is part of Commitment #30 in Appendix A of this SER. The staff considers the Open Item 3.5.2.3.2-1 resolved.

<u>OI-4.2.1(c):</u> (Section 4.2.2.1 - Reactor Vessel Materials Upper-Shelf Energy Reduction Due to Neutron Embrittlement)

In RAI 4.2.1(c), the staff requested the applicant to provide all fluence data for all welds and plates in the beltline and specify which one is bounding with respect to the RPV USE evaluation. In response to RAI 4.2.1(c), in a letter dated October 3, 2003, the applicant provided 54-EFPY surface fluences and 54 EFPY 1/4T fluences for all the beltline material but identified materials that are bounding with respect to the RPV material ART values at 54-EFPY. The applicant also needed to identify the USE for all beltline materials at 54-EFPYs and to identify the limiting materials for each unit. This was identified as Open Item 4.2.1(c).

The applicant's April 9, 2004, letter indicated that all beltline materials, except for the electroslag welds (ESWs) in Quad Cities Unit 2, will have predicted Charpy USE greater than 35 ft-lb, the minimum allowable USE based on the generic BWR equivalent margins analysis documented in BWROG topical report entitled, " 10 CFR Part 50 Appendix G Equivalent Margin Analysis for Low Upper Shelf Energy in BWR/2 Through BWR-6 Vessels." Therefore, all beltline materials, except for the ESW in Quad Cities Unit 2, meet the margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code.

The applicant reevaluated the USE value for Quad Cities Unit 2 ESW using all electroslag weld material surveillance test results from Quad Cities Unit 2, and performed a plant-specific EMA for the Quad Cities Unit 2 ESW. General Electric report GE-NE-0000-0027-0575-01, Revision 0, "The Upper Shelf Energy Evaluation for RPV Electroslag Welds at Quad Cities Unit 2," issued March 5, 2004, included in the applicant's April 9, 2004 letter, contains this analysis. Using the limiting surveillance capsule 18 data and the methodology in RG 1.99, Revision 2, the predicted Charpy USE for the ESW welds is 34.2 ft-lb, which is below the minimum established in the generic BWROG topical report. The applicant's plant-specific EMA was performed using methods and criteria contained in RG 1.161, "Evaluation of Reactor Pressure Vessels with Charpy Upper-Shelf Energy less than 50 Ft-Lb." and Appendix K of ASME Code, Section XI. Appendix K and RG 1.161 provide acceptance criteria and evaluation procedures for determining acceptability for operation of a reactor vessel when the vessel metal temperature is in the upper shelf range. The methodology is based on the principles of elastic-plastic fracture mechanics. Flaws will be postulated in the reactor vessel at locations of predicted low upper shelf Charpy impact energy, and the applied J-integral for these flaws will be calculated and compared with the J-integral fracture resistance of the material to determine acceptability. The applicant's analysis showed that the applied J-integral of the postulated flaws and the J-integral material fracture resistance with a minimum USE of 32.4 ft-lb satisfies the criteria of Appendix K of the ASME Code, Section XI and RG 1.161.

The analysis methods in Appendix K of the ASME Code initially followed the methodology in RG 1.161. The analysis methods in Appendix K of the ASME Code, Section XI were changed in the 1995 Addenda to the 1995 Edition. The analysis method in the 1995 Addenda to the 1995 Edition of the ASME Code changed the method of calculating the contribution to the applied J-integral because of a radial thermal gradient. This change was incorporated into the ASME Code to more accurately represent the contribution to the applied J-integral due to a radial thermal gradient. The applicant's analysis was performed using the earlier analysis method, i.e., the methods contained in RG 1.161. The staff confirmed the EMA using the analysis methods in both Appendix K to the ASME Code, Section XI, 1995 Addenda to the 1995 Edition, and the earlier analysis method in RG 1.161. This analysis included the effects of the extended power uprate condition. Since the limiting end of extended life USE for Quad Cities Unit 2 ESW exceeds the minimum value of 32.4 ft-lb demonstrated in the applicant's plant-specific EMA, the staff concludes that all beltline materials, including the ESW in Quad Cities Unit 2 RPV meet the margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code. Therefore Open Item 4.2.1(c) is closed.

OI-B.1.23-2: (Section 3.0.3.10.2 - One Time Inspection (B.1.23) - Plant Heating System components) and (Section 3.4.2.4.1 Main Steam System-One Time Inspection (B.1.23) - Plant Heating System components)

By RAIs B.1.23-1, B.1.23-2, B.1.23, and B.1.23-2.1 through B.1.23-2.6, the applicant was requested to justify use of the One-Time Inspection program to manage aging effects for various carbon steel, alloy steel, stainless steel, cast iron, and neoprene components in environments such as moist air, steam, water (condensate), and containment atmosphere. By letters dated October 3, 2003, January 26, 2004, and March 25, 2004, the applicant responded to the staff's RAIs as follows:

1) By RAIs B.1.23-1, B.1.23-2(a), B.1.23-2.3 and B.1.23-2.4, the staff questioned use of the One-Time Inspection program to manage loss of material and cracking for carbon steel, stainless steel, cast iron, brass or bronze, and iron components in lube oil and fuel oil environments. This was identified as Confirmatory Item B.1.23-1. By letters dated October 3, 2003, January 26, 2004 and April 9, 2004, the applicant stated that aging management program, B.2.5, "Lubricating Oil Monitoring Activities," will be expanded to manage loss of material and cracking for oil coolers and other components in lube oil, turbine electro-hydraulic control (EHC) fluid, and generator hydrogen seal oil environments for the emergency diesel generator system, station blackout diesel generator system, high pressure coolant injection

system, electro-hydraulic control system, reactor core isolation cooling system (Quad Cities), and generator hydrogen seal oil system (Quad Cities). Aging management program, B.1.23, "Fuel Oil Chemistry," will be expanded to manage loss of material for components in a fuel oil environment for the station blackout diesel generator system. The One-Time Inspection program will not be credited to manage the aging effects for these components since periodic inspections will be implemented. The staff considers the Lubricating Oil Monitoring Activities and Fuel Oil Chemistry aging management programs appropriate to manage these aging effects; therefore, staff finds this acceptable.

2) Table 3.3.2 of the LRA identifies components in the Plant Heating System which credit the One-Time Inspection program to manage aging effects for components in a saturated steam or condensate environment. By RAIs B.1.23-1 and B.1.23-2(a) & (b), staff requested the applicant to justify use of one-time inspections to manage the aging effects for these components. By letters dated January 26, 2004 and March 25, 2004, the applicant stated that Plant Heating System components in a saturated steam or condensate environment would be managed by aging management program, B.2.8, "Periodic Inspection of Plant Heating System." The program includes periodic inspections to manage cracking, loss of material, or leakage of selected brass/bronze, carbon steel, cast iron, and stainless steel components. The staff considers the Periodic Inspection of the Plant Heating System program appropriate to manage these aging effects; therefore, staff finds this acceptable.

3) For the main steam system flexible hoses in a containment nitrogen environment, Reference Number 3.4.2.18 of the LRA does not identify any aging effects for these neoprene hoses. By RAIs 3.4.1-3 and B.1.23-2.1, staff requested the applicant to justify with respect to temperature, radiation levels, and time, why neoprene hoses do not require aging management. In responses dated October 3, 2003 and January 26, 2004, further review by the applicant indicated that hoses in Reference Number 3.4.2.18 and 3.4.2.19 of the LRA are not comprised of an elastomer material as earlier reported but are made of stainless steel with an overall stainless steel outer braided jacket. Based on the hose material being stainless steel, the applicant will use the One-Time Inspection program to verify that the hoses are constructed of metal rather than an elastomer material. Any hoses found to be constructed of an elastomer during the one-time inspection will be replaced with metal flexible hoses. The One-Time Inspection program will perform inspections of the installed metal hoses for mechanical damage. This applies to Quad Cities only. The applicant has noted that stainless steel hoses are installed at Dresden. The staff considers use of the One-Time Inspection program acceptable to verify that stainless steel hoses are installed and to inspect the stainless steel hoses for damage.

4) For non-safety-related (NSR) vents or drains, piping, and valves in various systems, the LRA identifies loss of material due to corrosion for carbon steel, stainless steel, brass, or bronze in an environment of air, moisture, humidity, and leaking fluid. By RAI 3.3-2, the staff requested the applicant to describe the types of corrosion expected and to provide criteria for selecting one-time sample locations for these types of corrosion. The applicant stated in its letter dated October 3, 2003 that general, crevice, and pitting corrosion are expected in these components. The applicant compiled a list of the in-scope NSR vents and drains for the various systems throughout the plants. The One-Time Inspection program will inspect a selected number of NSR vent and drains for the affected systems. The sample population will be representative of all material and environment combinations but may not include components for every system. The criteria used for selection of susceptible inspection locations are as follows: 1)

Corrosiveness of fluid passing through the vent, drain, or piping when in service. Those components servicing more corrosive fluids are given preference. 2) Duration of service when performing venting and draining operations. Those components with higher durations of service are given preference. 3) Frequency of performance of venting and draining operations through the selected components. Those components with higher performance frequencies are given preference. 4) Period that component has been in service. Those components that have been in service longest are given preference. By RAIs B.1.23-2(b) and B.1.23-2.2, staff requested further justification that a one-time inspection is adequate to manage the aging effects for these vent, drains, and valves. By letters dated October 3, 2003 and January 26, 2004, the applicant stated that the NSR vents, drains, valves, and piping are normally outboard of closed safety relief valves or closed isolation valves and are not likely to contain moisture. Any appreciable leakage or condensation inside these vents and drains would be identified in the course of periodic operations or through the daily monitoring of unidentified inputs to radwaste by the operating department. Malfunctioning isolation valves or other degraded conditions are promptly repaired, replaced, or corrected. For the reasons stated above, the applicant considers the rate of material loss due to corrosion to be slow; therefore, one-time inspections will confirm the assumption that loss of material due to corrosion is occurring at a sufficiently slow rate for the subject components. In the event that the results of the one-time inspections fail to provide this confirmation, evaluations will be performed in accordance with the site corrective action process to identify actions, including possible periodic inspections of the vents and drains. Based on the applicant's response, staff concurs that the loss of material due to corrosion for the subject vents, drains, piping, and valves are considered to occur at a sufficiently slow rate such that a one-time inspection is adequate to manage this aging effect; therefore, staff finds this acceptable.

(5) By RAIs B.1.23-2 and B.1.23-2.6, the staff requested the applicant to provide justification for using one-time inspections to manage carbon steel, cast iron, alloy steel, elastomer, and neoprene components in a moist air environment that 1) varies with normal plant conditions, 2) is impractical to monitor or control routinely, and 3) is similar to the environments associated with the Aging Management References listed in part b of RAI B.1.23-2. This was identified as Open Item B.1.23-2. By letter dated March 25, 2004, the applicant concluded by further review that periodic inspections of components in this population would be appropriate. A new aging management program, B.2.9, "Periodic Inspection of Components Subject to Moist Air Environments," was developed for these components. Specifically, the applicant will perform periodic inspections of a representative sample of stainless steel, carbon steel, cast iron, aluminum, copper, brass, and bronze components normally exposed to environments of air and steam; moist air; saturated air; warm moist air; moist containment atmosphere; steam or demineralized water; and hot diesel engine exhaust gases containing moisture and particulates. In addition, the program inspects flexible hoses to detect age-related degradation prior to the loss of function.

The applicant considers a one-time inspection appropriate for managing aging effects for the standby gas treatment system and HVAC systems components with an internal environment of "occasional exposure to moist air" and an external environment of "ambient plant air" or "warm moist air." Components in these systems include doors, closure bolts, equipment frames, piping, fittings, valves, ducts, and filters fabricated of cast iron, carbon steel, brass, bronze, stainless steel, and copper. Based on the materials and environments for these ventilation system components, the applicant believes that either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, or (b) an aging effect is expected to progress very slowly. Based on favorable operating history that revealed no widespread corrosion in the affected system, a limited number of components were selected as representative of the ventilation systems. The worst-case one-time inspection locations will include the following: the air intake ductwork of the standby gas treatment system; main control room HVAC ductwork; emergency diesel generator HVAC air intake ductwork; reactor building HVAC ductwork downstream of the steam coils and chilled water cooling coils; and main control room HVAC drip pan and drainpipe. If the one-time inspection detects corrosion resulting in material loss, results of the examination will be evaluated by engineering to determine the rate of material loss and the need for additional inspections. Unacceptable results will be documented in the corrective action program.

Based on the applicant's response, staff considers the Periodic Inspection of Components Subject to Moist Air Environments acceptable to manage components in a moist air environment and the One-Time Inspection program acceptable to manage ventilation systems components where either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, or (b) an aging effect is expected to progress very slowly. Therefore Open Item B.1.23-2 and Confirmatory Item B.1.23-1 are closed.

1.6 Summary of Confirmatory Items

As a result of its review of the LRA for QCNPS and DNPS, including additional information submitted to the NRC through June 22, 2004, the staff identified the following confirmatory items. An issue was considered confirmatory if the staff and the applicant have reached a satisfactory resolution, but the resolution has not yet been formally submitted to the staff. Each confirmatory item (CI) has been assigned a unique identifying number. The items identified in this section have been properly closed by the technical staff.

CI.2.3.4.2-3: (Section 3.1.2.4.1 - Reactor Vessel)

The staff needed the following information from the applicant so that it can evaluate the aging management of the capped CRD nozzles—(1) description of the configuration and location of the capped nozzle including the existing base material for the nozzle, piping (if piping remnants exist) and cap material, and any welds and material type (i.e., 82/182), (2) description of how these welds and caps are managed (e.g., the applicability of the BWRVIP-75 inspection requirements); and (3) discussion on whether the event at Pilgrim (leaking weld at capped nozzle, September 30, 2003) is applicable to Dresden and Quad Cities. A description of the Pilgrim event is discussed in LER 2003-006-00, dated November 24, 2003, which states that the cracking was in an 82/182 weld metal that was repaired extensively. The applicant also needed to include in the discussion the past inspection techniques applied, the results obtained, mitigative strategies followed, weld repairs carried out, and any other relevant information. This was identified as Confirmatory Item 2.3.4.2-3.

In the applicant's letters dated January 26, 2004, and April 9, 2004, the applicant responded to supplementary RAI 2.3.4.2-3. In the applicant's letters, the applicant provided information related to configuration and locations of the capped nozzles for each plant and described how they are managed. At Dresden and Quad Cities, the configuration consists of 304L and 316L SS caps and safe-ends welded to the original carbon steel nozzles. Aging management for these components includes examination in accordance with Section XI of the ASME Code for the nozzle as stated in AMP B.1.6, "CRD Return Line Nozzle," and one-time inspection in accordance with AMP B.1.23, "One-Time Inspections" for the remaining portion (safe-end, cap and welds). AMP B.1.2, "Water Chemistry" is also credited for these components.

In addition, the applicant stated that the Pilgrim event does not apply to Dresden and Quad Cities because (1) Pilgrim used an Alloy 600 cap welded directly to the nozzle whereas D/QCNPS used a SS cap and installed a SS safe-end between the cap and the nozzle, (2) Pilgrim used Alloy 82/182 welds whereas D/QCNPS used 308L and 309L SS welds, and (3) Pilgrim had initial weld defects (lack of fusion) that required repair, whereas D/QCNPS welds were completed without requiring any repair. D/QCNPS further stated that their nozzles and caps had radiographic and penetrant testing performed during installation, and had subsequent ultrasonic inspection of the nozzle-to-safe end welds and safe end-to-cap welds in response to the Pilgrim event with no reportable indications. Also, per the D/QCNPS ISI programs, penetrant testing had been performed on these welds with no recordable indications. In addition, Dresden and Quad Cities have placed their capped lines (small bore piping-less than 4 inches) in the One-Time Inspection Program, B.1.23. The staff finds the applicant's response acceptable because it uses low carbon stress corrosion resistant stainless steel safe-ends, caps, and weld material in lieu of Alloy 600, which has been known to be susceptible to stress corrosion cracking based on operating experience. In addition, the caps were welded using low carbon stainless steel weld metal (308L and 309L) with no weld repairs or recordable defects. Pilgrim used Inconel 82/182 and had initial weld defects that required weld repairs, which may have contributed to the cracking. Therefore, Dresden and Quad Cities capped return line nozzle configuration is not similar to Pilgrim and the use of AMPs B.1.2, B.1.6 and B.1.23 is acceptable for managing the aging of these components. Therefore, Confirmatory Item 2.3.4.2-3 is closed.

<u>CI.3.0.3.14.2-1:</u> (Section 3.0.3.14.2- Structures Monitoring Program (B.1.30))

The additional information provided by the applicant in its response to RAI B.1.30 sufficiently answers the questions posed by the staff, with two exceptions. It was not clear whether the category "Piping Component Supports including immediately adjacent piping/tubing," listed in the response to item (a) of the RAI is meant to include non-ASME piping supports. It also was not clear as to why the Structures Monitoring Program does not include "standard components such as snubbers, struts and spring cans." In order to completely resolve the response to this RAI, the staff requested that the applicant confirm the following:

(a) the B.1.30 program covers non-ASME piping supports
(b) there are no snubbers, struts and spring cans on non-ASME piping and components

This issue was identified as Confirmatory Item 3.0.3.14.2-1.

In its response to Confirmatory Item 3.0.3.14.2-1, dated December 5, 2003, the applicant stated:

> Exelon has reviewed the supplemental Information Request and provides the following clarification and confirmation.
>
> 1)The Structure Monitoring Program, B.1.30, includes non-ASME piping supports for aging management. The selection of component supports includes a representation of supports throughout the plant, considering environmental conditions as well as configuration.

2)There are standard components such as snubbers, struts, and spring cans on non-ASME piping and components that are in-scope of the License Renewal, which are required to be managed for aging. The Structural Monitoring Program, B.1.30, will inspect the non-ASME component supports including the standard components. The in-scope non-ASME component supports are addressed in LRA Section 2.4.15, Table 2.4-15 under the Component Groups "Support Members" with a "Non-S/R Structural Support" component intended function. Aging Management Reference 3.5.1.29 discusses the aging management of the non-ASME component supports.

The staff finds the applicant's response to Confirmatory Item 3.0.3.14.2-1 to be acceptable, because it clarified that the "Structural Monitoring Program," B.1.30, will inspect non-ASME piping and component supports, including snubbers, struts, and spring cans. This commitment is stated in the enhancements as "The program will provide for inspection of a sample of non-insulated indoor piping external surfaces at locations immediately adjacent to periodically inspected piping supports and inspection of standard components such as snubbers, struts, and spring cans." under B.1.30, Structures Monitoring Program, in the applicant's response to OI-3.5.2.3.2 1: (Section 3.5.2.3.2- ASME Section XI, Subsection IWF (B.1.27)), dated June 22, 2004. Therefore Confirmatory Item 3.0.3.14.2-1 is resolved. This is part of Commitment #30 in Appendix A of this SER.

<u>CI.3.1.2.3.2-1:</u> (Section 3.1.2.3.2 - BWR Vessel ID Attachment Welds Program)

In RAI 4.2-BWRVIPs, the staff requested the applicant to submit the necessary commitments, information, and changes for each of the following applicable BWRVIP reports:

- BWRVIP-05
- BWRVIP-18
- BWRVIP-25
- BWRVIP-26
- BWRVIP-27
- BWRVIP-38
- BWRVIP-41
- BWRVIP-42
- BWRVIP-47
- BWRVIP-48
- BWRVIP-49
- BWRVIP-74
- BWRVIP-75
- BWRVIP-76
- BWRVIP-78
- BWRVIP-86
- Other BWRVIP reports applicable to license renewal

In response to RAI 4.2-BWRVIPS, in a letter dated October 3, 2003, the applicant summarized the NRC's request for information in the seven elements listed below and presented its response to each of those elements.

(1) Verify that Dresden and Quad Cities are bounded by the conditions (materials configuration and inspection methodologies) specified in the applicable BWRVIP documents.

Response: The BWRVIP documents were assembled with participation from the NSSS supplier and a wide representation from the BWR Owners Group, providing a level of confidence in accuracy and bounding conditions of these documents. However, during a preliminary review when preparing this response, some material differences were noted. Exelon will perform a detailed review of the applicable BWRVIP documents and verify that Dresden and Quad Cities are bounded by the conditions specified or identify and evaluate any exceptions noted.

(2) Provide a commitment to implement programs consistent with the applicable BWRVIP documents or identify the applicable exceptions.

Response: At the completion of the review noted in item 1 above, Exelon will provide a list of commitments to the applicable BWRVIP documents or identify specific exceptions taken.

(3) Describe how the commitments will be tracked.

Response: The commitments, once identified, will be placed in the site implementing procedures with traceability back to the license renewal commitment being made.

(4) Summarize a program description of the applicable BWRVIP documents in the LRA Appendix A, UFSAR Supplement.

Response: Several of the BWRVIP programs are identified in the LRA Appendix A, such as BWRVIP-75, A.1.7; BWRVIP-27, A.1.8; BWRVIP-48, A.1.4; BWRVIP-49, A.1.8; BWRVIP-78, A.1.22; and BWRVIP-86, A.1.22. Once the comprehensive list of commitments is identified in item 2 above, Exelon will update the LRA Appendix A to provide a summary program description to address each applicable BWRVIP document.

(5) Verify that technical specification changes needed to support implementation of the applicable BWRVIP documents have been identified and processed.

Response: There are no additional technical specification changes anticipated. However, once the detailed review summarized in item 1 above is complete, Exelon will confirm that no technical specification changes are needed or identify the needed changes to be processed prior to the start of the extended term of operation.

(6) Identify and evaluate any potential TLAA issue identified by the applicable BWRVIP documents and/or commitments to perform future inspections when inspection tooling is made available.

Response: All applicable TLAAs are discussed in Section 4 of the LRA.

(7) Address items 1 through 6 above for the 16 specific BWRVIP documents listed in the RAI and identify and address other BWRVIP documents applicable to license renewal.

Response: Based on a preliminary review, there appears to be several other BWRVIP documents applicable to license renewal, such as BWRVIP-07 and BWRVIP-63 for core shroud repairs, and BWRVIP-26 for Water Chemistry. Once the detailed review is completed, Exelon will provide an amended response addressing items 1 through 6 for all BWRVIP documents applicable to license renewal.

The staff found the applicant's response incomplete. The response committed to perform a detailed review of the BWRVIP documents applicable to license renewal, prepare an amended response addressing items 1 through 7 for all of those documents applicable to license renewal, and submit it to the staff for review and approval. Therefore, this response was incomplete until an amended response was submitted and approved by the staff. This was identified as Confirmatory Item 3.1.2.3.2-1.

In a letter dated April 9, 2004, the applicant submitted the following amended response to RAI 4.2-BWRVIPs addressing the seven items, which were listed in the initial response to RAI 4.2-BWRVIPs, for all of the BWRVIP documents applicable to license renewal.

1. Verify that Dresden and Quad Cities are bounded by the conditions (materials, configuration and inspection methodologies) specified in the applicable BWRVIP documents.

Amended Response: The site-specific procedures at D/QCNPS implemented all of the inspection methodologies contained in the applicable BWRVIP documents. Additionally, the materials and configurations at D/QCNPS are similar to those specified in the BWRVIP documents with an exception related to the steam dryer hold-down bracket attachment weld (addressed in response to Supplementary RAI B.1.4). Regarding inspection methodologies, the applicant has identified two exceptions related to BWRVIP-74: (1) use of risk-informed ISI to supplement the ISI and GL 88-01 programs for reactor pressure vessel nozzles and safe ends, and (2) use of an NRC-approved code case for the inspection of the reactor vessel leak detection line. The first exception is evaluated in SER Section 3.1.2.4.1 and the second one in SER Section 3.1.2.2.4.

2. Provide a commitment to implement programs consistent with the applicable BWRVIP documents or identify the applicable exceptions.

Amended Response: D/QCNPS provided a commitment for implementing the programs consistent with the applicable BWRVIP documents and identified several exceptions. These exceptions are associated with BWRVIP-38, BWRVIP-41, BWRIP-74, and BWRVIP-75 and are described in SER Sections 3.1.2.3.6 and 3.1.2.4 as appropriate. In addition, the applicant has committed to implement several BWRVIP reports that are being reviewed by the NRC, and will identify any exceptions associated with these reports after the staff's reviews are completed. See amended response 7 for the several BWRVIP reports being reviewed by the NRC. This is part of Commitment #9 in Appendix A of this SER.

3. Describe how the commitments will be tracked.

Amended Response: All license renewal commitments are controlled by the Exelon commitment management process described in LS-AA-110, Commitment Management. Commitment tracking files will be generated for each individual activity credited to implement the requirements of the AMP. In addition, steps in site procedures that implement the various activities specified in the BWRVIP documents are annotated as NRC commitments and are referenced to commitment tracking files that contain sufficient documentation describing the source of the commitment.

4. Summarize a program description of the applicable BWRVIP documents in the LRA Appendix A, UFSAR Supplement.

Amended Response: The FSAR Supplement (LRA Appendix A) Programs A.1.1, A.1.2, A.1.4, A.1.8, A.1.9, and A.1.22 have been updated to reflect the applicable BWRVIP documents, and exceptions as noted in response to Item 2 above. A revised FSAR supplement incorporating these changes was submitted to NRC in the attachment to Exelon transmittal letter dated March 5, 2004 as part of the annual update required by 10 CFR 54.21(b).

5. Verify that technical specification changes needed to support implementation of the applicable BWRVIP documents have been identified and processed.

Amended Response: The only Technical Specification change required for both sites involves revision to the site pressure temperature (P-T) curves. The existing P-T curves will be revised for 54 EFPY prior to the extended term of operation.

6. Evaluate any potential TLAA issue identified by the applicable BWRVIP documents and/or commitments to perform future inspections when inspection tooling is made available.

Amended Response: All applicable TLAA's were discussed in Section 4 of the LRA. The applicant also committed to perform future inspections, as recommended by the BWRVIP documents, when inspection tooling is made available. This commitment is discussed in SER Section 3.1.2.3.6.

7. Address Items 1 through 6 above for the 16 specific BWRVIP documents listed in the RAI and identify and address other BWRVIP documents applicable to license renewal.

Amended Response: In addition to the 16 specific BWRVIP documents listed in RAI 4.2-BWRVIPs, the applicant has identified four additional documents applicable to license renewal: BWRVIP-29, BWRVIP-79, BWRVIP-104, and BWRVIP-116. NRC has issued a safety evaluation report for the first document (BWRVIP-29) but not for the remaining three. However, the applicant has provided an amended response in their letter dated April 9, 2004, addressing items 1 through 6 for all 20 BWRVIP documents applicable to license renewal and has committed to implement these 20 BWRVIP documents as discussed in the amended response to Item 2.

The staff found the responses to RAI 4.2-BWRVIPs acceptable because they addressed all the license renewal applicant action items as identified in the applicable BWRVIP reports, which are listed in the response. In addition, the exceptions identified by the applicant are approved by the staff. The staff has reviewed the updated FSAR Supplement programs and found that they include adequate summary descriptions of the applicable BWRVIP documents. Thus the responses are consistent with the BWRVIP reports applicable to license renewal. Therefore, Confirmatory Item 3.1.2.3.2-1 is closed.

<u>CI.3.1.2.3.6-1:</u> (Section 3.1.2.3.6 - BWR Vessel Internals Program)

The staff issued RAI B.1.9-b requesting the applicant to confirm whether D/QCNPS follows the BWRVIP-25 guidelines for managing aging of the rim hold-down bolts and, if so, to identify and evaluate whether the projected stress relaxation in the rim hold-down bolts is a TLAA issue. In response to RAI B.1.9-b, in a letter dated October 3, 2003, the applicant stated that D/QCNPS follows the BWRVIP-25 guidelines for management of the hold-down bolts. However, the

D/QCNPS core plates had wedges installed along with the repair of their shrouds with tie rods. The applicant further stated that BWRVIP-25 does not recommend inspection of rim hold-down bolts if wedges are installed. The staff reviewed BWRVIP-25 and confirmed the accuracy of the applicant's statements made in this response. The staff finds the applicant's response acceptable because it follows the recommendations of BWRVIP-25, which is approved by the staff. However, the applicant did not identify whether stress relaxation in the rim hold-down bolts is a TLAA. This was identified as Confirmatory Item 3.1.2.3.6-1.

In response, the applicant stated that the stress relaxation of the rim hold-down bolts is not a TLAA for Dresden or Quad Cities. Dresden and Quad Cities have installed wedge retainers, which structurally replace the lateral load resistance provided by the rim hold-down bolts. As such, the failure of the bolts due to stress relaxation is no longer a concern and inspection of the bolts is not required. Therefore the stress relaxation of the rim hold-down bolts does not meet the TLAA Criterion 5 - "involve conclusions or provide the basis for conclusion related to the capability of the core plate to perform its intended function." Additionally, neither the rim hold-down bolts, nor the wedges meet TLAA Criterion 3 - "time-limited assumptions defined by the current operating term." The staff finds this response acceptable because the rim hold-down bolts no longer provide structural load and do not meet the definition of a TLAA as defined in 10 CFR 54.3(a)(3) and (5). In a letter dated January 26, 2004, the applicant submitted the information described above. Therefore, Confirmatory Item 3.1.2.3.6-1 is closed.

<u>CI.3.1.2.3.8-1:</u> (Section 3.1.2.3.8 - Reactor Vessel Surveillance program)

In response to Part 2 of Supplemental RAI B.1.22, in a letter dated November 21, 2003, the applicant stated that if staff does not approve the proposed BWRVIP-116, the applicant will provide a plant-specific surveillance plan for the license renewal period in accordance with 10 CFR Part 50, Appendices G and H, prior to entering the renewed license period. This is Commitment #22 in Appendix A of this SER. This is considered Confirmatory Item 3.1.2.3.8-1.

In response to Part 2 of Supplemental RAI B.1.22, in a letter dated November 21, 2003, the applicant stated that if the staff does not approve the proposed BWRVIP-116, Exelon will provide a plant-specific surveillance plan for the license renewal period in accordance with 10 CFR Part 50, Appendices G and H, prior to entering the renewed license period. This is part of Commitment #22 of Appendix A of this SER. This was identified as Confirmatory Item 3.1.2.3.8-1. The staff finds the response acceptable because the applicant commits to provide a plant-specific surveillance program for the license renewal period in accordance with 10 CFR Part 50, Appendices G and H, if the staff does not approve the proposed BWRVIP-116. In a letter dated April 9, 2004, the applicant concurred with Commitment #22. Therefore, Confirmatory Item 3.1.2.3.8-1 is closed.

<u>CI.3.1.2.4.2-1:</u> (Section 3.1.2.4.2 - Reactor Vessel Internals (Including Fuel Assemblies and Control Blades))

The response to RAI 3.1.7b states that Dresden and Quad Cities will implement the BWRVIP recommendations and manage the effects of aging of IASCC through AMPs B.1.2 (Water Chemistry) and B.1.9 (BWR Vessel Internals). AMP B.1.9 is consistent with NUREG-1801 which references the use of BWRVIP-26 for the inspection of the reactor vessel internals, including the top guide, and BWRVIP-76 for the inspection of the shroud. However, according to Table 2-1 of BWRVIP-76, when fluences exceed 5 x 10^{20} n/cm^2, a plant-specific analysis is required to be submitted to the NRC. This issue was identified as Confirmatory Item 3.1.2.4.2-1.

In response to Confirmatory Item 3.1.2.4.2-1, in a letter dated April 9, 2004, the applicant states that Table 2-1 of BWRVIP-76 provides inspection guidance for welds in un-repaired core shrouds. Note 4 of Table 2-1 indicates that for plants where fluence at the shroud exceeds 5x10^{20} n/cm^2, a plant-specific analysis is required to be submitted to the NRC. However, this analysis is only for un-repaired core shrouds. Since the core shrouds at Dresden and Quad Cities have been repaired and the repairs structurally replace the horizontal welds, the plant-specific analysis suggested by Table 2-1 is not applicable to these shrouds. The applicant further states that the inspection frequencies for the D/QCNPS shrouds are determined using the guidance contained in Section 3 of BWRVIP-76. The applicant inspects the vertical core shroud welds in accordance with BWRVIP-76, Section 3. The staff finds the response consistent with BWRVIP-76. Since the applicant has committed to implement BWRVIP-76 when the staff SER is issued, this completes our review of this issue. Therefore, Confirmatory Item 3.1.2.4.2-1 is closed.

CI.4.2.1: (Section 4.2.2.1 - Reactor Vessel Materials Upper-Shelf Energy Reduction Due to Neutron Embrittlement)

The data for copper content in the limiting beltline plate and limiting beltline weld material presented in LRA Section 4.2.1 appear to be different from the data presented in Appendix F to the Dresden UFSAR. For example, LRA Table 4.2.1-2 lists 0.24 percent copper for the Dresden Unit 2 limiting beltline weld material, whereas Table 22 in Appendix F lists a maximum copper content of 0.21 percent for Dresden Unit 2. In RAI 4.2.1(b), the staff requested the applicant to resolve this apparent discrepancy. This was identified as Confirmatory Item 4.2.1.

In response to RAI 4.2.1(b), in a letter dated October 3, 2003, the applicant provided the following explanation:

> For the beltline region, Table 21 (Shell Course 57—Lower Shell) and Table 22 (Shell Course 58—Lower-Intermediate Shell) of the Dresden FSAR gives values actual chemical analysis of these materials. Tables 21 and 22 contain the chemical analysis for electroslag welds contained in the original FSAR. Since the original publication of the FSAR, the accepted best estimate chemistry for Electroslag Weld (ESW) materials used in B&W vessels accepted by the NRC staff is 0.24% Cu and 0.37% Ni. These values are reported in BAW-2258, "Evaluation of RT_{NDT}, USE and Chemical Composition of Core Region Electroslag Welds for Dresden Units 2 and 3," Framatome Technologies, January 1996, and were previously accepted by the NRC in its review of pressure temperature (P-T) limit curve report GE-NE-B13-02057-04R1a. Exelon submitted reactor vessel chemistry values to the NRC in July 1998 in response to Generic Letter 92-01, Supplement 1. The information provided in that response is included in NRC database RVID.

The staff accepts the applicant's response because the staff has verified the percentage of copper content given in LRA Tables 4.2.1-1 to 4.2.1-8 for the limiting beltline USE materials with the corresponding data in RVID. Therefore, Confirmatory Item 4.2.1 is closed.

CI.4.2.1(a): (Section 4.2.2.1 Reactor Vessel Materials Upper-Shelf Energy Reduction Due to Neutron Embrittlement)

The peak EPU fluence on the vessel is located at approximately 82 inches above the bottom of active fuel and is applied to the lower-intermediate shell and axial welds. Additionally, axial flux distribution factors are applied to different elevations (by shell) in the beltline region. For the lower shell, the peak fluence is adjusted by the axial flux distribution factor based on an elevation approximately 42 inches above the bottom of active fuel, which represents the lower to lower-intermediate girth weld. The axial flux distribution factor for this location is 0.71. The applicant stated that it applied this factor for calculating the peak pre-EPU fluence for the lower to lower-intermediate shell girth weld and all lower shell materials. In a followup question to RAI 4.2.1(a), the staff requested the applicant to describe how the pre-EPU axial flux profile compares with the EPU axial flux profile. The staff also requested that the applicant submit information about how the axial flux distribution factor was used in calculating the peak-EPU fluence for the lower to lower-intermediate shell girth weld and all lower shell materials. This was identified as Confirmatory Item 4.2.1(a).

In a letter dated April 9, 2004, the applicant referred to Figure 2 in a letter from Exelon to NRC, "Additional Information Regarding Request for License Amendment for Pressure-Temperature Limits," dated July 31, 2003. This figure shows the pre-EPU and EPU axial flux distribution at the inside surface of the reactor pressure vessel. The pre-EPU and EPU axial flux distribution profiles are different, since the pre-EPU flux peaks at an elevation higher than the mid-plane, whereas the EPU flux peaks at the mid-plane. The applicant stated that for determining the peak 54-EFPY surface fluences at the lower shell plate material, lower shell welds and the lower to lower-intermediate shell girth weld, the axial flux distribution factor of 0.71 is applied for pre-EPU and 0.74 is applied for EPU conditions. The staff has independently verified the axial flux distribution factors using the data presented in the figure mentioned above and also verified the peak surface fluences for the lower shell and associated welds as calculated by the applicant. The staff finds the response acceptable because the applicant has used appropriate axial flux distribution factors for calculating the peak 54-EFPY surface fluence for the lower to lower-intermediate shell girth weld and all lower shell materials when determining the limiting materials. Therefore, Confirmatory Item 4.2.1(a) is closed.

<u>CI.4.2.1.6:</u> (Section 4.2.1.6 - Reactor Vessel Circumferential Weld Examination Relief)

The applicant was required to submit an update to LRA Section 4.2.6 to include the circumferential weld examination relief analysis for Quad Cities in accordance with 10 CFR 54.3(a) upon staff's approval of the May 16, 2003, relief request. This issue was identified as Confirmatory Item 4.2.1.6.

In response to Confirmatory Item 4.2.1.6, in a letter dated March 5, 2004, the applicant submitted a revision to the UFSAR Supplement for the reactor vessel circumferential weld examination relief TLAA. The revised supplement refers to the documents related to RPV circumferential weld relief request extension for the license renewal term. The staff reviewed this supplement and found that it provides an adequate summary description regarding the evaluation of this TLAA. Therefore, Confirmatory Item 4.2.1.6 is closed.

<u>CI.4.2.2:</u> (Section 4.2.2.7 - Reactor Vessel Axial Weld Failure Probability)

This axial weld failure probability analysis is required to be performed as a license renewal action item in accordance with the staff FSER of EPRI report TR-113596 (BWRVIP-74) and compliance with the license renewal rule (10 CFR Part 54) enclosed in an October 18, 2001, letter from Mr. C.I. Grimes to Mr. C. Terry. This action item, as stated in the staff's March 7, 2000, letter to Mr. C. Terry, requires the license renewal applicant to monitor axial beltline weld embrittlement. One acceptable method is to determine that the mean RT_{NDT} of the limiting axial beltline weld at the end of the extended period of operation is less than the values specified in Table 1 of this FSER. Therefore this evaluation applies to Dresden Units 2 and 3, as well as to Quad Cities Units 1 and 2. In addition, Dresden and Quad Cities have the same mean RT_{NDT}, because the initial RT_{NDT}, chemical composition, and 54-EFPY surface fluence are the same for the limiting beltline axial welds at Quad Cities and Dresden. Therefore, for Quad Cities and Dresden plants, the mean RT_{NDT} for the limiting beltline axial welds at 54-EFPYs is equal to 19 °C (67 °F). A comparison of the mean RT_{NDT} value of 33 °C (91 °F) for the Clinton axial weld from Table 4.2-1 of this SER with the Dresden and Quad Cities value of 19 °C (67 °F) shows that the NRC analysis of the Clinton axial welds bounds the Dresden and Quad Cities welds. The applicant should confirm that Quad Cities Units 1 and 2 have a mean value of 19 °C (67 °F) and address this TLAA of the axial welds for Quad Cities in the UFSAR Supplement. This was identified as Confirmatory Item 4.2.2.

In response to Confirmatory Item 4.2.2, in a letter dated March 25, 2004, the applicant compared the limiting axial weld 54-EFPY properties for Quad Cities 1 and 2 against the corresponding limiting values calculated by the NRC in the SER for BWRVIP-05 at 64 EFPY and the limiting Clinton values taken from Table 2.6-5 in the March 7, 2000, supplement to the SER. The applicant confirmed that the limiting axial welds at Quad Cities Units 1 and 2 have a mean 54 EFPY RT_{NDT} of 19°C (67°F), which is less than the value of 33°C (91°F) for Clinton. The comparison also shows that the conditional vessel failure probabilities for Quad Cities Units 1 and 2 are equal to 2.08×10^{-7} and 5.27×10^{-7}, respectively. These failure probabilities are less than the corresponding value for Clinton listed in Table 4.2-1 of this SER. The staff finds the applicant's evaluation for this TLAA acceptable because the conditional probability of failure of Quad Cities Unit 1 and 2 limiting axial welds at 54 EFPY is smaller than the corresponding values calculated by the NRC staff in the SER for BWRVIP-05 at 64 EFPY and the limiting Clinton values found in the March 7, 2000, supplement to the SER.

In a letter dated March 5, 2004, the applicant submitted a revision to the UFSAR supplement for the reactor vessel axial weld failure probability. The staff reviewed this supplement and found that it provides an adequate summary description regarding the evaluation of this TLAA. Therefore, Confirmatory Item 4.2.2 is closed.

<u>CI.B.1.2-1:</u> (Section 3.0.3.2 -Water Chemistry Program (B.1.2))

The staff noted that due to a potential difference in the concentration of sodium pentaborate in the system (the tank and suction piping are typically at a much higher concentration from the remainder of the system), that the proposed chemistry inspections may not provide information on the condition of the tank and pump suction piping. The staff requested in RAI B 1.2 -1 that the applicant provide supplemental information regarding how aging degradation of the SBLC tank and suction piping will be managed, since sampling chemistry downstream of the tank and receipt inspection of the chemicals used in the tank will not provide adequate assurance that degradation is not occurring in this section of the system. This issue was identified as Confirmatory Item B.1.2-1.

The applicant responded in letters dated December 22, 2003 and March 25, 2004, that it will perform an ultrasonic examination of portions of the SBLC tank. This is part of Commitment

#23 of Appendix A of this SER. The ultrasonic examinations will be used to identify potential loss of material and stress corrosion cracking. The applicant will perform one ultrasonic inspection in each quadrant, near the bottom of the tank. The applicant considers this location to be the most susceptible location for degradation. The UT examinations will include a portion of the tank shell and vertical seam weld and, if accessible, a portion of a circumferential weld in accordance with the applicant's NDE procedures. If necessary, the exam results will be addressed by the applicant's corrective action program.

The staff finds that the applicant will adequately manage aging in the SBLC system through the combined use of inspection of the pump casing, ultrasonic inspection of the SBLC tank, and control of addition chemicals according to the applicant's receipt inspection program. Therefore, Confirmatory Item B.1.2-1 is closed.

<u>CI.B.1.17:</u> (Section 3.3.2.3.2 - BWR Reactor Water Cleanup System (B.1.17))

Since the applicant stated that the entire RWCU system piping was replaced with IGSCC-resistant piping in accordance with NRC GL 89-10, the staff subsequently requested the applicant to provide the following information to be verified by the NRC Audit-Inspection Team:

(i) Clarify whether the entire RWCU system piping was replaced with IGSCC-resistant material or whether only portions of the RWCU system piping for each plant were replaced.

(ii) Confirm that, if the entire RWCU system piping was replaced, the piping system includes all the RWCU welds inboard and outboard of the second isolation valves. Confirm whether the selection of material of the replaced piping and weld metal meet the material compositions as described in GALL AMP XI.M25.

(iii) Verify that, if only portions of the RWCU system piping were replaced, the entire RWCU system piping meets the screening criteria, 1(a), (b), and (c) in GALL AMP XI.M25 program element 1, Scope of the Program, as well as the material specifications in GALL AMP XI.M25 program element 2, Preventive Actions.

This was identified as Confirmatory Item B.1.17.

During the audit, the team confirmed the following technical information relating to this AMP with the applicant at the request of the NRC's technical staff:

- All in-scope portions of the RWCU system piping outboard of the second isolation valves were replaced with ASTM SA312 or SA376 Gr. TP316L with a carbon content of less than 0.035%. RWCU piping inboard of the second isolation valve have not been replaced with IGSCC resistant piping.

- The RWCU piping that is inboard of the second isolation valve is Class 1 and 2 piping that is managed by the ISI Program (B.1.1), ASME Section XI, Subsections IWB, IWC, and IWD. All of the RWCU piping and welds on the in-scope portion outboard of the second isolation valves were replaced. The replacement piping and weld metal meets the material compositions as described in NUREG-1801, AMP XI.M25.

- All the RWCU piping and welds on the in-scope portion outboard of the second isolation valves were replaced with piping and weld material that meet the material compositions as described in NUREG-1801, AMP XI.M25. Screening criteria 1(a), (b), and (c) of NUREG-1801, AMP XI.M25 do not apply to this piping.
- In a letter to the NRC, dated August 20, 1993, the licensee committed to replace all RWCU IGSCC susceptible outboard supply and return line piping and the regenerative heat exchangers with IGSCC resistant materials at both Dresden and Quad Cities.

License Renewal Boundary Drawings LR-DRE-M-30 and LR-QDC-M-47-1 show the piping design table for the in-scope portion of the RWCU piping outboard of the second isolation valves to be table AQ. Dresden specification K-4080 and Quad Cities specification R-4411 provide the material specification for piping design table AQ. Design table AQ provides the information on the piping material: all in-scope portions of the RWCU system piping outboard of the second isolation valves were replaced with ASTM SA312 or SA376 Gr. TP316L with a carbon content of less than 0.035%.

Based on the above information, the applicant confirmed that the ten elements of the GALL program, "BWR Reactor Water Cleanup System," as specified in NUREG-1801, AMP XI.M25 (with the exception of the Water Chemistry Program as noted in the LRA) are applicable to Dresden and Quad Cities, and that the applicant's program B.1.17 is consistent with GALL AMP XI.M25, with the exception as noted in the LRA.

On the basis of its review of this AMP, GALL AMP XI.M25, AMR topical report M.05, and the ISI Program plan, the audit team determined that this AMP is consistent with GALL AMP XI.M25, with the exception as noted in the LRA. Therefore, Confirmatory Item B.1.17 is closed.

<u>CI.B.1.23-1:</u> (Section 3.0.3.10 - One Time Inspection (B.1.23))

See response for Open Item B.1.23-2.

<u>CI.B.1.23-2.5:</u> (Section 3.3.2.3.7 Periodic Inspection of Plant Heating System (B.2.8))

The applicant concluded that the Periodic Inspection of Plant Heating System program provides assurance that plant heating system components are routinely inspected for deterioration and leakage, and will adequately manage the components aging effects. The applicant stated that the program provides reasonable assurance that intended functions are maintained consistent with the current licensing basis during the period of extended operation. The staff compared the program against BTP RLSB-1. This issue was identified as Confirmatory Item B.1.23-2.5.

By letter dated March 25, 2004, the applicant described its program to manage loss of material, cracking, and leakage in selected plant heating system components for Dresden and Quad Cities exposed to an environment of saturated steam and condensate. The staff reviewed this program using the guidance in Branch Technical Position RLSB-1 in Appendix A of the SRP-LR and focused on how the program manages aging effects through the effective incorporation of the following 10 elements: program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience. The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled Quality Assurance Program. The staff's evaluation of the Quality Assurance Program is provided separately in Section 3.0.4 of this SER. The remaining seven elements are discussed below. The staff also reviewed the UFSAR supplements for Dresden and Quad Cities to determine whether they provide an adequate description of the program.

[Program Scope] The program will manage age related degradation of plant heating system components such as filter/strainer housings, piping and fittings, pump casings, sight glasses, tanks, thermowells, traps, tubing, and valves. The staff finds that the scope is acceptable because it includes those components that rely on the program for aging management.

[Preventive or Mitigative Actions] The plant heating system periodic inspections do not provide any preventative actions. The inspections provide for condition monitoring to detect degradation prior to a loss of function. Preventative or mitigative actions are not needed for this condition monitoring program; therefore, the staff finds this acceptable.

[Parameters Monitored or Inspected] Visual inspections will be performed on a representative sample of brass or bronze valves, carbon steel piping and fittings, cast iron filter housings, pump casings and valves, and stainless steel thermowells and tubing used in the plant heating systems to determine if aging degradation is occurring. The components are inspected to ensure they are free of cracking, loss of material, and leakage. The inspection will consist of a visual inspection on the internal surface of components for the presence of general, crevice, galvanic, and pitting corrosion. The staff concludes that the applicant is inspecting the appropriate parameters to identify the aging effects; therefore, the staff finds this acceptable.

[Detection of Aging Effects] The plant heating inspections are performed a periodic intervals, and they detect aging prior to the equipment leaking so as to prevent spatial interaction with safety-related equipment. Inspections will be performed in accordance with ASME Code requirements and certified NDE examiners will conduct a VT-3 visual examination. The staff finds this acceptable because the inspections will identify the aging effects managed by this program.

[Monitoring and Trending] The condition of the components used in plant heating systems are monitored at intervals of approximately every 5 years, but not trended. Components are replaced if damage or unacceptable leakage is detected. Operating experience states that leaks were identified and corrected in a timely manner and did not result in a loss of function of any safety-related component. Staff finds that monitoring of these components periodically every 5 years is adequate to identify aging degradation; therefore staff finds this acceptable .

[Acceptance Criteria] The applicant stated that components are inspected for cracking, loss of material, and leakage. The components are replaced if a degraded condition is found. Inspections will be performed in accordance with ASME Code requirements and corrective actions state that evaluations are performed for inspection results that do not satisfy established criteria. The staff finds that the applicant's proposal to perform inspections in accordance with ASME Code requirements and use of engineering evaluations of degradation components will provide acceptance criteria against which the need for corrective actions will be evaluated; therefore, staff finds this acceptable.

[Operating Experience] The applicant stated that Dresden and Quad Cities have experienced leaks in the plant heating systems, but that these leaks were identified and corrected in a timely manner and did not result in a loss of function of any safety-related system, structures, or components. The staff notes that the plant heating system is in scope of license renewal due to the potential for spatial interactions. The staff finds that the operating experience of timely correction of system leaks plus the additional periodic visual inspections supports the applicant's conclusion that the program will be effective in managing aging of the components in the scope of this program; therefore, the staff finds this acceptable. Therefore Confirmatory Item B.1.23-2.5 is closed.

<u>CI.B.1.25-1:</u> (Section 3.0.3.12 - Buried Piping and Tanks Inspection)

The staff had additional concerns regarding concrete asbestos piping and buried carbon steel piping and requested clarifying information. Specifically, with regard to concrete asbestos piping, the applicant's operating history indicated that failures of the piping have occurred. On the basis of this experience, the staff requested justification for why a one-time inspection was not warranted, as well as confirmation that the soil environment for the piping was not aggressive. With regard to buried carbon steel piping, the applicant indicated that much of the piping may not be coated. Given that some of the piping may not be coated, the staff questioned why this was not identified as an exception to the GALL program. This was identified as Confirmatory Item B.1.25-1.

The applicant responded to the staff's request for supplemental information in letters dated December 12, 2003 and March 25, 2004. The applicant indicated that the buried concrete piping likely failed as a result of ground shifting or heavy loads transported in the vicinity of the piping. This piping is located in a soil and ground water environment which is not aggressive to concrete based on pH values between 7 to 9, chlorides 5 to 30 ppm, and sulfates 10 to 30 ppm. These values are within the NUREG 1801 criteria (chlorides less than 500 ppm, sulfates less than 1500 ppm and pH greater than 5.5). The applicant indicated that buried carbon steel and ductile iron piping in the Fire Suppression System are externally coated with coal tar wrapping; however, there was some question regarding use of coating on other carbon steel buried piping. The applicant provided supplemental information after a detailed review of plant documents that indicates that all carbon steel buried piping at Dresden and Quad Cities was externally coated. The applicant further indicated that the installation specification required an inspection of the coating integrity prior to burial. The applicant provided operating experience from a recent plant modification that required excavation of some Fire Suppression System piping at Quad Cities. A section of 10 inch schedule 40 carbon steel piping was recently excavated. The applicant indicated that the piping was coated with coal tar wrapping and had been buried in the early 1970's. The nominal wall thickness of this piping is 0.365 inches. The measured minimum and maximum wall thicknesses were 0.320 inches and 0.400 inches respectively. The applicant concluded that there was little effect of aging on this piping after burial for approximately 30 years. The applicant also surveyed the craft personnel who performed the work to assess the condition of the external pipe coating. The applicant provided qualitative information that the coating was "generally in good condition" based on the craft personnel. The staff finds the applicant's response acceptable because the applicant provided information regarding the cause of the concrete piping degradation, provided information consistent with NUREG 1801 that indicates the environment is not aggressive to concrete, that there is reasonable assurance that the buried piping is coated and provided additional operating experience that indicates there is limited aging degradation of buried piping. Therefore, Confirmatory Item B.1.25-1 is closed.

CI.B.2.5-1: (Section 3.0.3.16 Lube Oil Monitoring Activities)

In its October 3, 2003, response to RAI B.1.23-2(a), the applicant committed to include the following additional components in the scope of this program: components in the reactor core isolation cooling (RCIC) system, additional components in the high pressure coolant injection (HPCI) system, additional components in the emergency diesel generator and auxiliaries system, and additional components in the station blackout diesel system. In addition, the applicant committed to add components exposed to EHC oil (main turbine and auxiliary systems) and generator hydrogen seal oil (turbine oil system - Quad Cities only) to the scope of this program. The staff found that adding the above components to the scope of this program is appropriate, since maintaining oil quality is important for preventing aging effects. However, the applicant did not provided updates to the program elements to address the increased scope of the program. The applicant was requested to provide the appropriate revisions to the 10 elements and the UFSAR summary description of this program. This issue was identified as Confirmatory Item B.2.5-1.

In its draft supplemental response dated December 18, 2003, the applicant further committed to add components exposed to EHC oil (main turbine and auxiliary systems) and generator hydrogen seal oil (turbine oil system) to the scope of this program. The applicant added these components to the scope of the program by letter dated January 26, 2004. The staff found that adding the above components to the scope of this program is appropriate, since maintaining oil quality is important for preventing aging effects in these components.

In a letter dated June 22, 2004, the applicant committed to include the following additional component in the scope of this program: components in the reactor recirculation motor generation oil system. The staff found that adding the above component to the scope of this program is appropriate, since maintaining oil quality is important for preventing aging effects in these components.

[Program Scope] The applicant stated that this AMP is applicable to heat exchanger and other components exposed to a lubricating oil environment in the HPCI, emergency diesel generator and auxilaries, (SBO) diesel and auxlilaries, reactor core isolation cooling (RCIC), generator hydrogen seal oil (HSO), main turbine and auxiliaries (electro-hydraulic control (EHC) oil subsystem), and reactor recirculation motor generator systems. The staff finds that the scope is acceptable because it includes those components that rely on the program for aging management.

[Preventive or Mitigative Actions] The applicant's program monitors and controls the oil properties and impurity levels. When the parameters exceed predefined limits, actions are taken to restore the conditions. The staff finds that maintaining the oil parameters mitigates loss of material and cracking in lubricating oil systems; therefore, the staff finds this acceptable.

[Parameters Monitored or Inspected] The applicant stated that the parameters monitored by the program include viscosity, total acid number, total base number, rotary bomb oxidation test, water demulsability, particle count, fuel and combustion byproducts, sediment, water, antifoaming characteristics, whole particle counting, air release and emission spectrum. The applicant also stated that the parameters monitored by the program depends on oil type and type of service. The staff notes that loss of material due to general, crevice, and pitting corrosion and cracking are applicable aging effects for lubricating oil cooler components in a lubricating oil environment at locations containing water or contaminants such as chloride ions. By RAI B.2.5(a), the staff asked the applicant to clarify whether water, moisture, and chloride ions are monitored for all type of oil and service. If not, the staff requested the applicant to provide justification for not including these parameters in monitoring. In its response dated October 3, 2003, the applicant stated that water/moisture is monitored as part of the Lubricating Oil Monitoring Activities program. No monitoring for chloride ions is provided in this program. The applicant explained that EPRI 1003056, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 3, Appendices C and G were reviewed in the development of the Lubricating Oil Monitoring Activities program. These appendices address oil environments in general and lubricating oil environments for heat exchangers, respectively. Appendix C identifies damaging effects associated with chlorides in fuel oil environments, but no similar effects are identified for lubricating oil environments. Appendix G does not identify any applicable aging effects associated with chlorides for lubricating oil environments in heat exchanger components. The applicant also stated that there is no site operating experience of failure or degradation in oil environments attributed to the presence of chlorides. Therefore, the applicant concluded that monitoring for chloride ions is not required for the Lubricating Oil Monitoring Activities program. Based on the applicant's operating experience, the staff finds that the applicant's response satisfactorily addresses the staff's concerns and RAI B.2.5(a) is considered closed. The staff concludes that the applicant is monitoring the appropriate oil parameters; therefore, the staff finds this acceptable.

[Detection of Aging Effects] The applicant stated that samples of lubricating oil are taken monthly for EDGS, EHC oil, reactor recirculation motor generator oil, and HSO systems, quarterly for HPCI, SBO diesel generators, semi-annually for the RCIC pump, and every 24 months for the RCIC turbine. Sampling frequency is increased if plant and equipment operating conditions indicate a need to do so. The applicant stated that the sampling would reveal aging degradation because increased impurities and degradation of oil properties indicate degradation of material in lubricating oil systems. The staff finds this acceptable because sampling and analyses are performed periodically, and the analysis is capable of detecting aging degradation.

The staff also notes that the aging effects of the heat exchangers are also managed by the "Closed-Cycle Cooling Water System" and/or "Heat Exchanger Test and Inspection Activities," AMPs B.1.14 and B.2.6, respectively. For other components, the applicant uses the One-Time Inspection Program (B.1.23) to verify the effectiveness of the Lube Oil Monitoring Activities AMP. The inspections and performance testing under these programs provides additional assurance that loss of material and cracking will be detected before the loss of intended function; therefore, the staff finds this acceptable.

[Monitoring and Trending] The Lube Oil Monitoring program monitors the relevant parameters via samples taken monthly for EDGs, quarterly for HPCI, SBO diesel generators, EHC oil, and HSO systems, semi-annually for the RCIC pump, and every 24 months for the RCIC turbine. The oil analysis results are trended and evaluated using computer software and a database. The applicant stated that the lubricating oil analysis results are trended and evaluated using computer software and a database. The staff finds that monitoring through sample analysis is appropriate and that the frequency is consistent with industry experience; therefore, the staff finds the monitoring and trending to be acceptable.

[Acceptance Criteria] The applicant stated that normal, alert, and fault levels have been established for the various chemical and physical properties, wear metals, additives, and contaminant levels based on information from oil manufacturers, equipment manufacturers, and industry guidelines, for the specific oil type and application. The applicant also stated that the program maintains contaminant and parameter limits within the application-specific limits. By RAI B.2.5(b), the staff asked the applicant to explain the acceptance criteria of water, moisture, and contaminants. In its response dated October 3, 2003, the applicant provided the acceptable limits for water/moisture and contaminants at normal, alert, and fault levels for emergency diesel generator and SBO diesel components with MOBILGARD 450 NC oil and for HPCI turbine components with MOBIL VAPROTEC LIGHT oil. The applicant stated the acceptable limits are based on EPRI 1003056, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 3, and that any failures to meet these criteria result in a condition evaluation, an identification of root causes, and correction of the adverse condition. The staff finds that the acceptance criteria are consistent with industry guidelines and that the applicant's activities in case of failure to meet these acceptance criteria are reasonable; therefore, the staff finds the acceptance criteria acceptable.

[Operating Experience] The applicant stated that oil sampling and analysis have detected particulate or water contamination (or both) in lubricating oil systems. The operating experience has produced procedure and program changes, which have improved the effectiveness of lubricating oil testing and inspection activities. By RAI B.2.5(c), the staff asked the applicant to describe the corrective actions made and the operating experience since these corrective actions were implemented. In its response dated October 3, 2003, the applicant provided four examples of corrective actions made as a result of operating experience involving lube oil sampling and analysis. In one of the examples, the applicant stated that the 10/28/99 oil analysis of the Unit 1A (1B) SBO diesel engine crankcases indicated high percentage volume for sediment of 0.3 % (upper limit of 0.05% volume). All physical parameters other than sediment were found to be suitable for use. A recommendation was made to continue sampling/trending oil sample results on a quarterly frequency. The sampling procedure was revised to include requirements to perform sampling on a quarterly basis, and trend results. In another example, the applicant stated that a number of Quad Cities oil analysis results for RHRSW pump bearings showed high metal levels. It was determined that the high/increased wear level concentrations could have been indications of pump shaft, housing, rolling element bearing or bearing cage clearance wear. It was determined that the pump bearing oil analysis required large amounts of oil to be collected because smaller sample amounts had a tendency to show high/erratic wear levels. The sampling procedure was revised to include requirements to draw a relatively large sample. The applicant stated that no operating experience involving recurrence of heat exchanger degradations since implementation of the associated corrective actions. The staff finds that the applicant's response satisfactorily addresses the staff's concerns and RAI B.2.5(c) is considered closed. The staff finds that the applicant's operating experience supports the conclusion that the program will be effective in preventing aging of the components in the scope of this program; therefore, the staff finds this acceptable. Therefore Confirmatory Item B.2.5-1 is closed.

1.7 Summary of Proposed License Conditions

As a result of the staff's review of the DNPS/QCNPS application for license renewal, including the additional information and clarifications submitted subsequently, the staff identified three proposed license conditions. The first license condition requires the applicant to include the UFSAR Supplement in the next UFSAR update required by 10 CFR 50.71(e) following issuance of the renewed license. The second license condition requires that the future activities identified in the UFSAR Supplement and Appendix A of this SER to be completed prior to the period of extended operation. The third license condition requires the implementation of the most recent staff-approved version of the Boiling Water Reactor Vessels and Internals Project (BWRVIP) Integrated Surveillance Program (ISP) as the method to demonstrate compliance with the requirements of 10 CFR Part 50, Appendix H. Any changes to the BWRVIP ISP capsule withdrawal schedule must be submitted for NRC staff review and approval. Any changes to the BWRVIP ISP capsule withdrawal schedule which affects the time of withdrawal of any surveillance capsules must be incorporated into the licensing basis. If any surveillance capsules are removed without the intent to test them, these capsules must be stored in manner which maintains them in a condition which would support re-insertion into the RPV, if necessary.

2. 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

Title 10, Section 54.21, of the *Code of Federal Regulations* (10 CFR 54.21), "Contents of Application—Technical Information," requires that each application for license renewal (LR) contain an integrated plant assessment (IPA). The IPA must list and identify those structures, systems and components (SSCs) that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an aging management review (AMR).

In Section 2.1, "Scoping and Screening Methodology," of the license renewal application (LRA) the applicant described the scoping and screening methodology used to identify the SSCs at the Dresden and Quad Cities Nuclear Power Stations that are within the scope of license renewal and subject to an AMR. The staff reviewed the applicant's scoping and screening methodology to determine if it meets the scoping requirements stated in 10 CFR 54.4(a) and the AMR screening requirements stated in 10 CFR 54.21.

In developing the scoping and screening methodology for the Dresden and Quad Cities Nuclear Power Stations LRA, the applicant considered the requirements of 10 CFR Part 54, the statements of consideration related to the license renewal rule (the Rule), and the guidance provided in the Nuclear Energy Institute (NEI) report NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54—The License Renewal Rule." In addition, the applicant also considered the U.S. Nuclear Regulatory Commission (NRC) staff's license renewal interim staff guidance (ISG) documents and related correspondence.

2.1.2 Summary of Technical Information in the Application

In Sections 2.0 and 3.0 of the LRA, the applicant provided the technical information required by 10 CFR 54.21(a). In LRA Section 2.1, "Scoping and Screening Methodology," the applicant described the process used to identify the SSCs that meet the license renewal scoping criteria under 10 CFR 54.4(a), as well as the process used to identify the SSCs that are subject to an AMR as required by 10 CFR 54.21(a)(1). Additionally, LRA Section 2.2 ("Plant-Level Scoping Results"), Section 2.3 ("Scoping and Screening Results: Mechanical Systems"), Section 2.4 ("Scoping and Screening Results: Structures"), and Section 2.5 ("Scoping and Screening Results: Electrical and Instrumentation and Control Systems") provided the results of the process used to identify the structures and components (SCs) that are subject to an AMR.

2.1.2.1 Scoping Methodology

In Section 2.1 of the LRA, the applicant described the methodology used to scope mechanical, structural, and electrical and instrumentation and controls (I&C) SSCs pursuant to the requirements of the 10 CFR 54.4(a) scoping criteria. The applicant's scoping methodology, as described in the LRA, is presented in the sections below.

2.1.2.1.1 Application of the Scoping Criteria in 10 CFR 54.4(a)

The applicant described the general approach to scoping safety-related, non-safety-related (NSR), and SSCs credited with demonstrating compliance with certain regulated events in Section 2.1.2, "Application of Scoping Criteria in 10 CFR 54.4(a)," of the LRA. The scoping approaches specific to each of the three 10 CFR 54.4(a) scoping criteria are described in the following sections.

Application of the Scoping Criteria in 10 CFR 54.4(a)(1). In LRA Sections 2.1.2.1, "Title 10 CFR 54.4(a)(1)—Safety-Related," and 2.1.4, "Scoping Methodology" the applicant discussed the methodology used to identify SSCs meeting the 10 CFR 54.4(a)(1) safety-related license renewal scoping criteria. The applicant stated that at the Dresden and Quad Cities Nuclear Power Stations, safety-related classifications for components are documented on engineering drawings and in a controlled plant component database. The applicant relied upon the safety-related classification as reported in these source documents to identify SSCs satisfying scoping criteria of 10 CFR 54.4(a)(1).

Application of the Scoping Criteria in 10 CFR 54.4(a)(2). In LRA Sections 2.1.2.2 "Title 10 CFR 54.4(a)(2)—Non-Safety-Related Affecting Safety-Related", 2.1.4 "Scoping Methodology", and 2.1.6 "Additional Considerations Incorporated Into the Methodology", the applicant discussed the methodology used to identify SSCs meeting the 10 CFR 54.4(a)(2) non-safety-related license renewal scoping criteria. The applicant performed 10 CFR 54.4(a)(2) scoping evaluations using a two-stage process that consisted of an initial scoping evaluation followed by a revised scoping evaluation. During the initial 10 CFR 54.4(a)(2) non-safety-related scoping evaluation, the applicant identified non-safety-related SSCs that explicitly supported a safety-related function. The revised non-safety-related scoping methodology considered the potential adverse effects from the failure of non-safety-related SSCs attached to safety-related equipment and spatial interactions resulting from the failure of non-safety-related SSCs on the performance of a safety-related function. The applicant described both the initial and revised 10 CFR 54.4(a)(2) scoping methodology in Section 2.1.2.2 of the LRA.

Initial Non-safety-Related Scoping

In Section 2.1.2.2 of the LRA, the applicant stated that for every non-safety-related plant system or structure, applicable sections of the Dresden and Quad Cities Updated Final Safety Analysis Reports (UFSARs) and other current licensing basis (CLB) documents were reviewed to determine whether the system or structure was credited with supporting satisfactory accomplishment of a safety-related function. Based on this review, the applicant classified non-safety-related systems or structures explicitly credited in CLB documents with supporting accomplishment of a safety-related function as satisfying criterion 10 CFR 54.4(a)(2). Because the Maintenance Rule (10 CFR 50.65) includes SSCs scoping criteria similar to 10 CFR 54.4(a)(2), the applicant stated that the Dresden and Quad Cities Maintenance Rule functional evaluation reports were also reviewed to identify any additional non-safety-related system or structure functions that supported satisfactory accomplishment of a safety-related function. Non-safety-related SSCs functions that were identified in the Maintenance Rule functional evaluation reports as supporting a safety-related function and confirmed to be part of the CLB were classified as satisfying the 10 CFR 54.4(a)(2) scoping criterion.

Revised Non-safety-Related Scoping

Following issuance of NRC guidance on the identification and treatment of SSCs which meet 10 CFR 54.4(a)(2) in a March 15, 2002, letter from Mr. C. Grimes to Mr. A. Nelson, the applicant revised the non-safety-related scoping methodology. The applicant's revised methodology included non-safety-related SSCs connected to safety-related SSCs within the scope of license renewal up to the first equivalent anchor past the safety/non-safety interface. In addition, non-safety-related SSCs that had a spatial relationship such that their failure could adversely impact the performance of a safety-related SSCs intended function were included in the scope of license renewal. The applicant stated that it considered the pipe whip, jet impingement, general flooding, spray, and displacement/falling as spatial interactions during the revised 10 CFR 54.4(a)(2) scoping process. However, the applicant did not consider pipe whip, jet impingement, general flooding, or spray of a gas to be credible spatial interactions for gas systems to adversely affect safety-related SSCs. As such, those systems containing gas were excluded from the scope of the spatial interaction review and plant walkdowns. Displacement and falling were considered credible interactions for gas systems, and, thus, all supports for gas systems were included in the scope of license renewal.

Application of the Scoping Criteria in 10 CFR 54.4(a)(3). In LRA Sections 2.1.2.3, "Title 10 CFR 54.4(a)(3)—The Five Regulated Events," 2.1.3.5, "Technical Position Papers," 2.1.4, "Scoping Methodology," and 2.1.6, "Additional Considerations Incorporated Into the Methodology," the applicant discussed the methodology used to identify SSCs credited for performing a function that demonstrates compliance with regulations for fire protection (FP), environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout (SBO) pursuant to the 10 CFR 54.4(a)(3) license renewal scoping criteria. In Section 2.1.2.3 of the LRA, the applicant stated that, because the Dresden and Quad Cities Nuclear Power Stations are boiling water reactors (BWRs), 10 CFR 50.61, the regulation for pressurized thermal shock, was not applicable to the LRA. For each of the other four applicable regulated events, the applicant utilized technical position papers to provide input to the scoping process. The technical position papers identified (1) the systems and structures that are relied upon to demonstrate compliance with these regulations, (2) functional requirements for each system or structure, and (3) additional documentation that may be used for scoping of components credited to demonstrate compliance with each of the applicable regulated events. The applicant stated that guidance provided by the technical position papers was used to determine components credited in the regulated events. The SSCs credited in the regulated events have been classified as satisfying criterion 10 CFR 54.4(a)(3) and have been identified as within the scope of license renewal.

2.1.2.1.2 Documentation Sources Used for Scoping and Screening

In LRA Section 2.1.3, "Documentation Sources Used for Scoping and Screening," the applicant stated that information derived from the following sources was reviewed during the license renewal scoping and screening process:

- Updated Final Safety Analysis Reports
- Maintenance Rule Databases

- current licensing basis and design basis documents, including safety evaluation reports, technical specifications, licensing correspondence, and engineering evaluations and calculations

- system and structure operational description documents

- technical position papers prepared to support scoping evaluations of the regulated events identified in 10 CFR 54.4(a)(3)

- controlled plant component databases, such as the electronic work control system (EWCS) which contains integrated design and maintenance record management information at the level of detail at which distinct maintenance or modification activities typically are performed

- systems and structures lists created from system lists contained in the plant controlled database and the Maintenance Rule databases

- the license renewal database developed as a project tool to support various license renewal activities

The applicant stated that this information was used to identify the functions performed by plant systems and structures. These functions were then compared to the scoping criteria in 10 CFR 54.4(a)(1–3) to determine if the associated plant system or structure performed a license renewal intended function. These sources were also used to develop the list of structures and components subject to an AMR.

2.1.2.1.3 System, Structure, and Component Level Scoping

In LRA Section 2.1.4, "Scoping Methodology," the applicant described the scoping methodology for systems and structures that were safety-related, non-safety-related, or relied upon to perform a function to demonstrate compliance with the regulated events described in 10 CFR 54.4(a)(3). The applicant described the approaches used to scope mechanical systems, electrical and I&C systems, and structures in accordance with 10 CFR 54.4(a). The scoping methodology for each of these component classifications is described in the sections below.

<u>Mechanical System and Component Scoping Methodology</u>. In LRA Section 2.1.4.1, "Mechanical System Scoping Methodology," the applicant described the methodology for performing license renewal scoping of mechanical systems. The applicant identified six major activities associated with mechanical system scoping. These include identification of the system purpose and functions, determination of the system evaluation boundary, comparison of system functions against 10 CFR 54.4 (a)(1-3), identification of supporting systems, creation of license renewal boundary diagrams, and component-level scoping. Each of these activities is described below.

- identification of the system purpose and functions

  The applicant stated that a description was prepared for each mechanical system that identified all functions (intended and nonintended) that the system was designed to perform. The applicant used information obtained from the UFSAR system descriptions, Maintenance Rule database records, CLB documents, design-basis documents, piping and instrumentation diagrams (P&IDs), and system operating descriptions to develop the system description.

- determination of the system evaluation boundary

  The applicant identified a system evaluation boundary for each system, which included all of the components needed for the system to perform all of its functions, including those functions determined not to be license renewal (LR) intended functions.

- comparison of system functions against 10 CFR 54.4(a)(1–3)

  All identified system functions were compared against the criteria of 10 CFR 54.4(a)(1), (a)(2), and (a)(3). Each of the system functions satisfying scoping criteria in 10 CFR 54.4(a) was identified as a system intended function. The applicant's methodology permitted a system function to be classified as an intended function under more than one of the three scoping criteria in 10 CFR 54.4(a). Those systems for which no functions were identified as satisfying any of the three scoping criteria were classified as systems outside the scope of the Rule. When a system was determined to be outside the scope of the Rule, all of the components for that system listed in the LR database were identified as outside the scope of the Rule and were excluded from further scoping or screening evaluations. However, the applicant stated that it reviewed all components before they were excluded from further consideration to ensure that it did not inappropriately remove any safety-related or environmentally qualified components from the scope of license renewal.

- identification of supporting systems

  After a mechanical system was determined to be within the scope of the Rule, the applicant stated that an evaluation was performed to identify all of the in-scope system's supporting systems. Each of the supporting systems was then reviewed to determine if its failure could prevent satisfactory accomplishment of any intended function of the in-scope system. When the applicant identified that a supporting system was needed to maintain an intended function of the in-scope system, the supporting system was determined to be in scope.

- creation of license renewal boundary diagrams

  The applicant annotated plant P&IDs to create a license renewal boundary diagram for each mechanical system within the scope of license renewal. License renewal boundary diagrams included (1) the system evaluation boundary, (2) the in-scope components required to ensure success of the system intended functions, and (3) the out-of-scope components which are not required to ensure success of the system-level intended functions.

- component-level scoping

Following scoping of mechanical systems and the determination of system evaluation boundaries, the applicant performed component-level scoping. A system component list was developed in the license renewal database to support the mechanical component scoping methodology. The applicant reviewed the system functions, drawings, and other information sources to determine if failure of a system component would result in failure of a system intended function. A component was determined to be in scope if it was safety-related and met the criteria of 10 CFR 54.4(a)(1), if it was determined that the component was needed to fulfill a system intended function, if the component met the criteria of 10 CFR 54.4(a)(2), or if the component was needed to support the intended function of the system needed to meet the regulation for regulated events. The applicant stated that every safety-related component was included within the scope of the Rule. All other components in the LR database for a given system were reviewed to determine if they supported any of the intended functions for a given system.

The applicant stated that all electrical and I&C components within the evaluation boundary of in-scope mechanical systems were included within the scope of the Rule and evaluated using the spaces approach described in Section 2.1.4.2 of the LRA. The electrical and I&C components from all plant systems (mechanical/electrical and I&C) and structures were scoped collectively under one electrical and I&C component group. However, if the electrical and I&C components provided a mechanical component function, such as a pressure boundary, the components were evaluated individually for aging management along with other components in the mechanical system.

Structure and Structural Component Scoping Methodology. The applicant described the methodology used for structural scoping in Section 2.1.4.3, "Structure Scoping Methodology," of the LRA. Structures include freestanding buildings, separately evaluated rooms that are contiguous with freestanding buildings, the primary containment shell, tank foundations, the station chimney, and commodity-like groupings of cranes and hoists. The applicant stated that the list of structures used for scoping was developed through review of site plot drawings in conjunction with a walkdown of the property at each site. The UFSARs were relied upon to identify safety classification of structures and structural components. Class I structures and structural components were considered safety-related.

The structural scoping methodology described in the LRA was similar to the mechanical system scoping described in Section 2.1.4.1 of the LRA. Structure descriptions were prepared that included all structure functions. Structure evaluation boundaries were determined, including examination of structure interfaces. All structure functions were evaluated against the criteria of 10 CFR 54.4(a)(1–3) and the results of this evaluation were documented in the LR database. In those instances in which the structure intended functions were supported by other structures or systems, the supporting systems or structures were identified and evaluated against the criteria in 10 CFR 54.4(a)(2). The applicant stated that although a structural boundary drawing was not created for structures, a single boundary diagram based on site plot or equipment layout drawings was created for each site and displays all of the structures in relation to one another.

The applicant noted that, although the controlled plant component database includes some structural components such as pipe supports, equipment anchors, ladders, and doors, it does not include most of the structural components that constitute a structure. Therefore, for structures determined to be within the scope of the Rule, more detailed structural drawings were reviewed and, where needed, walkdowns were performed to identify structural elements (such as structural steel, foundations, floors, walls, ceilings, penetrations, stairways, or curbs). For in-scope structures, all structural components that are required to support the intended functions of the structure were entered into the LR database as generic structural components and were identified as within the scope of the Rule.

Electrical and Instrumentation and Control System and Component Scoping Methodology. The applicant described the methodology used to scope electrical and I&C systems in Section 2.1.4.2, "Electrical and Instrumentation and Control System Scoping Methodology," of the LRA. At the system level, the scoping methodology utilized for electrical and I&C systems was identical to the mechanical system-level scoping described in Section 2.1.4.1. The UFSAR, Maintenance Rule database records, CLB and design-basis documents, and system description documents applicable to the system were reviewed to determine the system safety classification and to identify all of the system functions. All system level functions were evaluated against the criteria of 10 CFR 54.4(a)(1–3). The supporting systems needed to maintain the in-scope system intended functions were identified and evaluated against the criteria in 10 CFR 54.4(a)(2). License renewal boundary diagrams were not created for electrical systems. However, boundary diagrams showing the basic electrical distribution throughout the plant and the associated switchyards were created for each site.

The applicant stated that the spaces approach was used to scope electrical and I&C components. Therefore, the applicant identified the electrical and I&C commodity groups that were installed in the plant rather than performing a detailed review to scope specific electrical and I&C components in each in-scope system.

Commodity Group Scoping. In Section 2.1.6 of the LRA, the applicant described its use of mechanical, structural, and electrical commodity groups for certain types of generic components during the scoping process. The use of these commodity groups for each of these scoping areas is discussed below.

- In Section 2.1.6 of the LRA, the applicant stated that mechanical system piping components that were not uniquely identified in the controlled plant component databases were evaluated as part of a system-specific commodity group. When a system was determined to include in-scope commodity items, the commodity items for the system were evaluated and were entered as a representative commodity component into the LR database for the system. For systems determined to have in-scope commodity components made of more than one material. The LR database was modified to include multiple commodity component records corresponding to the different component materials.

  The applicant also noted that Dresden and Quad Cities use thermal insulation and jacketing on piping and equipment for a variety of purposes. The applicant recognized that thermal insulation and jacketing on piping and equipment could not readily be scoped against the requirements of 10 CFR 54.4(a)(2) based simply on the plant system where they are used. Therefore, for each plant piping system, the applicant reviewed the insulated pipe plant specifications to determine which systems had installed insulation. For each piping system with insulation installed, the applicant identified an insulation commodity group representing all of the insulation of that type within the system and initially classified the insulation commodity group as within the scope of license renewal.

During AMR of the insulation commodity group, further evaluation of the design purpose for the insulation requirement for each system confirmed or revised the in-scope classification of the system insulation components.

- Structural elements and components were evaluated in commodity groupings that were based on similarity of materials and component functions. For example, an in-scope building comprises several wall elements and may include multiple, but similar, structural components such as equipment supports or doors. The scoping and screening evaluation did not identify and evaluate these multiple structural components on an individual basis. Rather, the evaluation grouped similar structural components as generic components for scoping and screening.

- Electrical and I&C components in electrical and I&C systems and some electrical and I&C components in mechanical systems and structures were evaluated as a consolidated electrical and I&C component group. Electrical components were identified and assigned to this consolidated electrical and I&C component group for scoping and screening evaluation. All components assigned to the consolidated electrical and I&C component group were initially identified as in scope of the Rule. After their assignment to the consolidated electrical and I&C component group, some individual components were reevaluated on the basis of their specific design function. If it were determined that the component did not perform an intended function as described in 10 CFR 54.4, the component was classified as outside the scope of the Rule.

2.1.2.2 Screening Methodology

Following the identification of SSCs within the scope of license renewal, the applicant implemented a process for determining which SSCs would be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1). In LRA Section 2.1.5, "Screening Methodology," the applicant discussed these screening activities as they related to the SCS that are within the scope of license renewal. These screening activities consisted of the identification of mechanical, structural, and electrical and I&C components within the scope of license renewal and subject to an AMR. The applicant's screening methodology described in the LRA for mechanical, structural, and electrical and I&C components is presented below.

2.1.2.2.1 Mechanical Component Screening

Following component-level scoping for mechanical systems, the applicant performed screening to identify those mechanical components that were subject to an AMR. As described in LRA Section 2.1.5.1, "Mechanical System Component Screening Methodology," the applicant used the following methodology.

After a mechanical system component was categorized in the LR database as within the scope of the Rule, the applicant classified the component as either active or passive based on an evaluation of the component description and type. The applicant used the active/passive component determinations documented in Appendix B of NEI 95-10, as guidance for this activity. Components that were recognized during screening as short-lived were eliminated from the AMR process, and the basis for the classification as short-lived was documented in the LR database. All other in-scope passive components were identified as long-lived. Long-lived, passive components within the scope of license renewal were identified as subject to an AMR and evaluated to determine their component-level intended function(s). During the AMR process, if detailed review of maintenance procedures and requirements determined that a component previously categorized as long-lived was subject to replacement based on a qualified life or specified time period, the component was recategorized as short-lived and eliminated from the AMR evaluation process. The results of the component screening were recorded in the LR database.

2.1.2.2.2 Structural Component Screening

Following component-level scoping for structures, the applicant performed screening to identify those civil/structural components that were subject to an AMR. In LRA Section 2.1.5.3, "Structural Component Screening Methodology," the applicant described the methodology used to screen civil/structural components. The applicant stated that when a structure or structural component was determined to be within the scope of license renewal, the structure screening methodology classified the component as passive. An evaluation was made to determine whether in-scope structural components were subject to replacement based on a qualified time period. If the in-scope structural component were subject to replacement based on a qualified time period, the component was identified as short-lived and was excluded from an AMR. The applicant stated that, except for a very limited number of structural components that were excluded on the basis of being subject to replacement per criterion 10 CFR 54.21(a)(1)(ii), all in scope structures and structural components were subject to an AMR.

2.1.2.2.3 Electrical and I&C Component Screening

In LRA Section 2.1.5.2, "Electrical and I&C System Component Screening Methodology," the applicant described the methodology used to screen electrical and I&C components. The applicant stated that, based on the spaces approach to AMR for electrical components, all electrical and I&C components classified as within the scope of the license renewal were evaluated as a consolidated electrical and I&C component group. The applicant stated that components were categorized as "active" or "passive" based on the determinations documented in Appendix B of NEI 95-10. In-scope components determined to be passive were identified in the LR database as subject to an AMR. In Section 2.1.6 of the LRA, the applicant stated that for most passive components within the scope of license renewal, the determination of whether a component was short-lived or long-lived was made during the AMR process when procedures for maintaining and replacing plant equipment were reviewed in detail. The component-level intended function(s) were determined for each in-scope passive component and recorded in the LR database. All passive electrical and I&C commodity components, such as cables, are subject to an AMR unless they were specifically evaluated and determined not to perform an intended function as described in 10 CFR 54.4. Electrical and I&C components from mechanical systems were screened collectively using the spaces approach along with similar components from electrical and I&C systems. This also applied to any electrical and I&C components associated with structures. Any mechanical or structural components in electrical and I&C systems that were determined to be within the scope of the Rule were categorized as "active" or "passive" based on the determinations documented in NEI 95-10.

2.1.3 Staff Evaluation

The staff evaluated the LRA scoping and screening methodology in accordance with the guidance contained in Section 2.1, "Scoping and Screening Methodology," of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." (SRP-LR). The acceptance criteria for the scoping and screening methodology review are based on the following regulations:

- 10 CFR 54.4(a), as it relates to the identification of plant SSCs within the scope of the Rule

- 10 CFR 54.4(b), as it relates to the identification of the intended functions of plant SSCs determined to be within the scope of the Rule

- 10 CFR 54.21(a)(1) and (a)(2), as they relate to the methods utilized by the applicant to identify plant structures and components subject to an AMR

As part of the review of the applicant's scoping and screening methodology, the NRC staff reviewed the activities described in the following sections of the LRA using the guidance contained in NUREG-1800:

- Section 2.1 ("Scoping and Screening Methodology") to ensure that the applicant described a process for identifying SSCs that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(1), (a)(2), and (a)(3)

- Section 2.2 ("Plant-Level Scoping Results"), Section 2.3 ("Scoping and Screening Results: Mechanical Systems"), Section 2.4 ("Scoping and Screening Results: Structures"), and Section 2.5 ("Scoping and Screening Results: Electrical and Instrumentation and Control Systems") to ensure that the applicant described a process for determining structural, mechanical, and electrical components at the Dresden and Quad Cities Nuclear Power Stations that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1) and (a)(2)

In addition, the staff conducted a scoping and screening methodology audit at Exelon corporate offices in Warrenville, Illinois, from May 20–23, 2003. The focus of the audit was to ensure that the applicant had developed and implemented adequate guidance to conduct the scoping and screening of SSCs in accordance with the methodologies described in the application and the requirements of the Rule. The audit team reviewed implementation procedures and engineering reports which describe the scoping and screening methodology implemented by the applicant. In addition, the audit team conducted detailed discussions with the applicant on the implementation and control of the license renewal program and reviewed administrative control documentation and selected design documentation used by the applicant during the scoping and screening process. The audit team further reviewed a sample of system scoping and screening results reports for the core spray (CS) system, reactor core isolation cooling (RCIC) system (Quad Cities only), isolation condenser (Dresden only), reactor building closed cooling water system, and main feedwater system to ensure that the methodology outlined in the administrative controls was appropriately implemented and the results were consistent with the CLB.

2.1.3.1 *Scoping Methodology*

The staff reviewed the scoping process to verify that the applicant's methodology was consistent with NUREG-1800 and other documented staff positions and that the scoping methodology adequately identified SSCs within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a).

2.1.3.1.1 Implementation Procedures and Documentation Sources Used for Scoping and *Screening*

The staff reviewed the applicant's scoping and screening implementation procedures to verify that the process used to identify structures and components subject to an AMR was consistent with the LRA and NUREG-1800 and that the applicant appropriately implemented the procedural guidance. Additionally, the staff reviewed the scope of CLB documentation sources used to support the LRA development and the process used by the applicant to ensure that CLB commitments were appropriately considered during the scoping and screening process.

Review of Methodology Implementation Procedures. The staff reviewed the following scoping and screening methodology implementation procedures and engineering reports:

- GE-NE-LRTI-2000, "Scoping and Screening of Systems, Structures, and Components for License Renewal"
- LRTI-16, "Identification of Non Safety-related Structures and Components Which Spatially or Structurally Interact With Safety-related Systems"
- PP-QDC-DRE Revision 00 IN, "Treatment of Pipe/Equipment Insulation During Scoping and Screening Systems for License Renewal"
- PP-DRE&QDC Revision 02-AP, "Active/Passive Classification and Intended Function Determination of Structures and Components"
- PP-DRE-QDC Revision 01 SPACES, "Scoping and Screening Position Paper for Electrical Components Based on Electrical Spaces Approach for Aging Management Review"
- Desktop Guide, "Scoping & Screening of Systems, Structures and Components"

In reviewing these procedures, the staff focused on the consistency of the detailed procedural guidance with information in the LRA and the various NRC staff positions documented in NUREG-1800 and ISG documents. The team found that the scoping and screening methodology instructions were generally consistent with Section 2.1 of the LRA and were of sufficient detail to provide the applicant's staff with concise guidance on the scoping and screening implementation process to be followed during the LRA activities.

During the scoping and screening methodology audit, the audit team identified that some of the applicant's implementation procedures were based on a version of NEI 95-10 that was not endorsed by the NRC. Specifically, the staff noted that the applicant used guidance from Revision 2 to NEI 95-10, dated August 2000, to develop certain portions of the scoping and screening procedures. For example, procedure PP-DRE&QDC Revision 02-AP, "Active/Passive Classification and Intended Function Determination of Structures and Components," Section 3, stated that the classification of components was performed in conformance and consistent with the guidelines provided in NEI 95-10, Revision 2. In Regulatory Guide 1.188, "Standard Format and Content for Application to Renew Nuclear Power Plant Operating Licenses," issued July 2001, the NRC endorsed Revision 3 to NEI 95-10, dated March 2001, as providing an acceptable method for complying with the license renewal rule. Because the applicant utilized a version of NEI 95-10 that has not been endorsed by the NRC staff for LRA development, in Request for Additional Information (RAI) 2.1-5, the staff asked the applicant to identify the differences that exist between Revisions 2 and 3 of NEI 95-10 and the potential impact on the LRA.

In its October 3, 2003, response to RAI 2.1-5, the applicant stated that, based on a comparison between NEI 95-10 Revision 2 and Revision 3, the major substantive changes involved the new LRA format; some changes to Appendix B, "Typical Structure, Component and Commodity Groupings and Active/Passive Determinations for the Integrated Plant Assessment"; and additional guidance on the treatment of consumables. The applicant stated that (1) there were no changes in Revision 3 of NEI 95-10 Appendix B tables for active/passive determinations for components that impacted the conclusions or methodology implemented for the Dresden/Quad Cities component screening and (2) the Exelon evaluation process for evaluating consumables was consistent with the screening guidance provided in Table 2.1-3 of NUREG-1800. The staff reviewed the changes between Revisions 2 and 3 of NEI 95-10, the applicant's guidance for active/passive screening determinations, and the applicant's treatment of consumable items. Based on these reviews, the staff concluded that the applicant's response to RAI 2.1-5 was reasonable and the use of NEI 95-10, Revision 2, for LRA development did not adversely impact the scoping and screening methodology. Therefore, RAI 2.1-5 has been resolved.

Methods Used to Review the Current Licensing Basis. The staff reviewed the scope and depth of the applicant's CLB review to verify that the methodology was sufficiently comprehensive to identify SSCs within the scope of license renewal and structures and components requiring an AMR. As defined in 10 CFR 54.3(a), the CLB is the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis that are docketed and in effect. The CLB includes certain NRC regulations, orders, license conditions, exemptions, technical specifications, design-basis information documented in the most recent updated final safety analysis report (UFSAR), and licensee 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.

The staff determined that LRA Section 2.1.3, "Documentation Sources Used for Scoping and Screening," provides a description of the CLB and related documents used during the scoping and screening process that is consistent with the guidance contained in NUREG-1800 and NEI 95-10. However, the applicant's methodology implementation procedures do not describe the process used to review certain CLB and design-basis documents such as safety evaluation reports (SERs), license event reports, and responses to NRC bulletins, generic letters, and enforcement actions in a manner that ensured that all system and structure functions were identified for the purposes of license renewal scoping. Because the staff was unable to fully evaluate the process used to review CLB documents, the staff requested in RAI 2.1-8 that the applicant describe the method(s) used to review the CLB documents identified in Section 2.1.3 of the LRA for the purposes of identifying all applicable SSCs functions.

In its October 3, 2003, response to RAI 2.1-8, the applicant stated that the first level of documents reviewed included the UFSARs, the Maintenance Rule databases, the system/structure design-basis documents, and the system/structure operational description documents. Based on references contained in the initially reviewed documents, the applicant stated that additional CLB documents such as SERs, license event reports, and responses to NRC bulletins, generic letters, and enforcement actions were identified for review. In addition, the applicant noted that electronic searches based upon key words or document numbers were also conducted. The staff concluded that the identification of CLB documents such as SERs, license event reports, and responses to NRC bulletins, generic letters, and enforcement actions using reference information from other parent CLB documents, in combination with electronic document searches, provides reasonable assurance that the applicant considered a broad scope of CLB document sources during scoping and screening. The staff determined that the applicant's response to RAI 2.1-8 was reasonable; therefore, RAI 2.1-8 is resolved.

Based on a review of information provided in Section 2.1 of the LRA, a review of the applicant's detailed scoping and screening implementation procedures, and the results from the scoping and screening audit, the staff concluded that the applicant's scoping and screening methodology considered a sufficient scope and depth of CLB information. The staff determined that the CLB documentation review methodology was capable of identifying SSCs intended functions in a manner consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21.

2.1.3.1.2 Application of the Scoping Criteria in 10 CFR 54.4(a)

The staff evaluated the applicant's methodology for scoping SSCs pursuant to the requirements of 10 CFR 54.4(a). The results of this staff evaluation are described below.

<u>Application of the Scoping Criteria in 10 CFR 54.4(a)(1)</u>. In part, 10 CFR 54.4(a)(1) requires that the applicant consider all safety-related SSCs that are relied upon to remain functional during and following design-basis events to ensure (1) the integrity of the reactor coolant pressure boundary, (2) the ability to shut down the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, to be within the scope of the license renewal.

The applicant performed scoping of safety-related SSCs in accordance with implementation procedure GE-NE-LRTI-2000 and the Scoping and Screening Desktop Guide. Section 4.1.4 of procedure GE-NE-LRTI-2000 includes a checklist used to determine if a structure or system meets the safety-related scoping criteria of 10 CFR 54.4(a)(1). Although the applicant's safety-related checklist items were similar to the criteria contained in 10 CFR 54.4(a)(1), the staff identified some differences. Specifically, the checklist items associated with safety-related scoping did not specifically address the full scope of potential offsite exposure limits referenced in 10 CFR 54.4(a)(1)(iii) and the spectrum of design-basis events to be considered for safety-related scoping. The staff requested additional information to clarify the use of the safety-related scoping questions. The staff's evaluation of these two issues is described below:

- Scope of Potential Offsite Exposure Limits Considered for Safety-Related Scoping

Although the wording in LRA Section 2.1.2.1, "Title 10 CFR 54.4(a)(1)—Safety-Related," is consistent with the scoping requirements of 10 CFR 54.4(a)(1)(iii), the safety-related scoping checklist items contained in Section 4.1.4 of procedure GE-NE-LRTI-2000 do not include all the exposure limitations referenced in 10 CFR 54.4(a)(1)(iii). Specifically, GE-NE-LRTI-2000 does not include a reference to offsite exposures limits comparable to those referred to in 10 CFR 50.34(a)(1) and 10 CFR 50.67(b)(2). Because the failure to consider exposure limitations contained in 10 CFR 50.34(a)(1) and 10 CFR 50.67(b)(2) could result in the omission of safety-related SSCs from the scope of license renewal, in RAI 2.1-1, the staff requested the applicant to describe how these exposure limitations, as applicable, were factored into the license renewal scoping and screening process.

In its October 3, 2003, response to RAI 2.1-1, the applicant clarified how the exposure limitations of Section 50.34(a)(1) and Section 50.67(b)(2) were factored into the scoping methodology. The applicant noted that 10 CFR 50.34 applies to applications for a construction permit and that Exelon has not applied for a construction permit for either the Dresden or Quad Cities stations. However, the applicant stated that it has submitted license amendment requests for the Dresden and Quad Cities stations to support application of an alternate source term methodology pursuant to 10 CFR 50.67(b)(2). To support the alternate source term submittal, the applicant evaluated the radiological consequence analyses of the four design-basis accidents (DBAs) that result in offsite exposure and identified proposed changes to the CLB. The applicant stated that none of the proposed CLB changes would result in changes to system or equipment license renewal intended functions. Based on this response, the staff concluded that the applicant adequately considered the exposure limitations associated with 10 CFR 50.34 and 10 CFR 50.67 in performing safety-related scoping. Therefore, RAI 2.1-1 is resolved.

- Spectrum of Design-Basis Events Considered for Safety-Related Scoping

In part, 10 CFR 54.4(a)(1) states that SSCs within the scope of license renewal include safety-related SSCs that are relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)). As defined in 10 CFR 50.49, design-basis events are conditions of normal operation, including anticipated operational occurrences, design-basis accidents, external events, and natural phenomena for which the plant must be designed. In regard to identification of design-basis events, Section 2.1.3, "Review Procedures," of NUREG-1800 states the following:

> The set of design basis events as defined in the rule is not limited to Chapter 15 (or equivalent) of the UFSAR. Examples of design basis events that may not be described in this chapter include external events, such as floods, storms, earthquakes, tornadoes, or hurricanes, and internal events, such as a high-energy-line break.

During the scoping and screening methodology audit, the NRC staff questioned how nonaccident design-basis events, particularly design-basis events that may not be described in the UFSAR, were considered during scoping. The staff noted that, although GE-NE-LRTI-2000, Section 4.1.4, includes safety-related scoping criteria similar to 10 CFR 54.4(a)(1), the procedure did not appear to clearly define the scope of design-basis events that were to be considered during scoping. During the scoping and screening methodology audit, the applicant was unable to provide sufficient information to demonstrate that design-basis events not included in the UFSAR Chapter 15 accident analyses were adequately considered during scoping. The staff determined that limiting the review of design-basis events to design-basis accidents described in Chapter 15 of the UFSAR could result in omission of safety-related functions described elsewhere in the CLB. For example, the Dresden UFSAR, Section 3.4.1.1, "External Flood Protection Measures," indicates that the isolation condenser has a safety-related function during a design-basis flooding event to provide core cooling. However, during the methodology audit, the team noted that the isolation condenser system-level intended functions did not include a safety-related function for providing capability to shut down the reactor and maintain it in a safe shutdown condition. Therefore, in RAI 2.1-7, the staff requested the applicant to explain the basis for the determination that the safety-related intended functions of the isolation condenser system did not include shutting down the reactor and maintaining it in a safe shutdown condition. Additionally, in RAI 2.1-7, the staff requested the applicant to describe the methodology used to ensure that all design-basis events (including conditions of normal operation, anticipated operational occurrences, design-basis accidents, external events, and natural phenomena) were addressed during license renewal scoping.

In its October 3, 2003, response to RAI 2.1-7, the applicant stated that the Dresden and Quad Cities site safety classifications were based on a definition of "safety-related" that did not incorporate the 10 CFR 50.49(b)(1) definition of design-basis events. Consequently, the applicant indicated that the CLB definition of "safety-related" for the Dresden and Quad Cities sites is not the same as that given in 10 CFR 54.4(a)(1). Specifically, the applicant noted that its CLB definition of "safety-related" does not include SSCs used to mitigate nonaccident design-basis events (e.g., such as tornados, external flooding, internal flooding, high-energy line breaks, dam failures, and earthquakes).

In preparation for responding to RAI 2.1-7, the applicant reviewed the SSCs credited for safe shutdown during nonaccident events to ensure that the intent of 10 CFR 54.4(a) was met. As a result of this review, the applicant identified additional components associated with high-energy line break nonaccident events that were within the scope of license renewal but had not been previously identified. The specific components added to the LR scope were associated with the applicant's scoping of non-safety-related high-energy systems and are described in "Application of the Scoping Criteria in 10 CFR 54.4(a)(2)," below. The applicant noted that the additional components included within the scope of license renewal as a result of nonaccident events were not classified as "safety-related" as defined in the licensing basis for each site. To remain consistent with the existing licensing basis for each site, these SSCs were included within the scope of license renewal under the criteria of 10 CFR 54.4(a)(2). Therefore, for the Dresden and Quad Cities sites, SSCs meeting the scoping criteria of 10 CFR 54.4(a)(1) were identified during the applicant's Section 54.4(a)(1) and Section 54.4(a)(2) scoping efforts.

With regard to the scoping of the safety-related function of the isolation condenser during a flooding event, the applicant stated that the CLB search for intended functions for the isolation condenser inadvertently missed the statement in Section 3.4.1.1 of the UFSAR crediting the core cooling function of the isolation condenser. Although inadvertently omitting SSCs intended functions described in the CLB could result in the failure to include appropriate equipment within the scope of license renewal, the staff determined that the additional reviews conducted by the applicant in response to RAI 2.1-7 provide additional assurance that intended functions have been identified. The staff concluded that the applicant's scoping efforts conducted pursuant to 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2), in addition to the scoping evaluations performed for RAI 2.1-7, ensured that SSCs meeting the scoping criteria of 10 CFR 54.4(1) were included within the scope of the rule and evaluated for aging management. Therefore, RAI 2.1-7 has been resolved.

Following scoping of structures and systems, the applicant performed safety-related component scoping. During the scoping and screening methodology audit, the applicant stated that the EWCS database included safety classification data for certain SSCs. The applicant stated that the safety classification obtained from the EWCS database was initially used to scope safety-related components. During the methodology audit, the staff identified that the EWCS safety classification field for several components was blank in the license renewal database. The applicant stated that a blank safety classification field indicated that a safety classification review of the component had not been performed, and therefore, the EWCS database did not have safety classification data for the component. The applicant stated that GE License Renewal Instruction Letter GE LR 002, Revision 3, related to GE-NE-LRTI-2000, provided guidance for handling EWCS component data deficiencies, including blank safety classification fields. The guidance stated that, if the component with a blank safety-related classification field was a daughter component to a safety-related parent component, then the daughter component should be classified as safety-related. If the component was not a daughter to a safety-related component, the guidance specified that further evaluation was needed. During the audit, the applicant stated that P&IDs and other controlled documents would be used in these cases to determine the proper safety classification. The staff determined that the applicant's utilization of EWCS safety classification data, including the resolution of data deficiencies, was reasonable.

The audit team reviewed a sample of the license renewal database 10 CFR 54.4(a)(1) scoping results and discussed the methodology and results with the applicant's license renewal project personnel. The team verified that the applicant had identified and used pertinent engineering and licensing information in order to determine the SSCs required to be in scope in accordance with the 10 CFR 54.4(a)(1) criteria. On the basis of this sample review, discussions with the applicant, and review of the applicant's scoping process, the staff determined that the applicant's methodology for identifying systems and structures meeting the scoping criteria of 10 CFR 54.4(a)(1) was adequate.

<u>Application of the Scoping Criteria in 10 CFR 54.4(a)(2)</u>. As required by 10 CFR 54.4(a)(2) all non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1) must be within the scope of the license renewal. Guidance for the staff review of non-safety-related scoping is provided in NUREG-1800, Section 2.1.3.1.2, "Non-safety-Related." The staff provided further expectations for determining what SSCs met the 10 CFR 54.4(a)(2) criterion in letters dated December 3, 2001, and March 15, 2002. In the December 3rd letter (ADAMS Accession No. ML013380013) the staff described the expectation that both seismic II/I piping segments and their supports should be included within the scope of license renewal under the 10 CFR 54.4(a)(2) criterion. Additionally, the letter provided specific examples of operating experience which identified pipe failure events (summarized in Information Notice (IN) 2001-09, "Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor") and the approaches the NRC considers acceptable to determine which piping systems should be included in scope based on the 54.4(a)(2) criterion. The March 15th letter (ADAMS Accession No. ML020770026) further described the staff's expectations for the

evaluation used to determine which non-safety-related SSCs are in scope due to the potential to adversely impact safety-related intended functions. The position states that applicants should not consider hypothetical failures, but rather should base their evaluation on the plant's current licensing basis, engineering judgement and analyses, and relevant operating experience. The paper further describes operating experience as all documented plant-specific and industry wide experience which can be used to determine the plausibility of a failure. Documentation would include NRC generic communications and event reports, plant-specific condition reports, industry reports such as significant operating event reports (SOERs), and engineering evaluations.

The applicant's methodology for performing 10 CFR 54.4(a)(2) scoping of non-safety-related SSCs was documented in implementation procedure GE-NE-LRTI-2000, the Scoping and Screening Desktop Guide, and license renewal technical instruction (LRTI)-16, "Identification of Non Safety-related Structures and Components Which Spatially or Structurally Interact With Safety-related Systems." The applicant performed the initial scoping of non-safety-related structures and systems using a checklist item contained in Section 4.1.4 of procedure GE-NE-LRTI-2000 to identify if a structure or system met the non-safety-related scoping criteria of 10 CFR 54.4(a)(2). During the scoping and screening methodology audit, the applicant stated that the checklist item applicable to 10 CFR 54.4(a)(2) was initially interpreted to apply only to non-safety-related structures and components that provided support functions to safety-related equipment. Following issuance of the staff's March 15, 2002, letter on scoping SSCs per 10 CFR 54.4(a)(2), the applicant revised the non-safety-related scoping methodology to consider non-safety-related SSCs seismic and spatial interactions that could adversely impact safety-related intended functions. Consequently, the applicant added Attachment 2, "Guidance for Identification and Documentation of Structures, Systems, and Components (SSCs) which Meet 10 CFR 54.4(a)(2)," to GE-NE-LRTI-2000 to provide guidance for the revised scoping of non-safety-related SSCs. Technical instruction LRTI-16 provided the detailed methodology for identifying non-safety-related SSCs that could spatially interact with safety-related SSCs. The LRTI-16 scoping process included the following steps:

- An inventory was taken to identify all systems that contain equipment located in each plant area that contained at least one safety-related component.

- The applicant completed a spatial interaction checklist to identify non-safety-related systems that could spatially interact with safety-related equipment. The checklist was completed based on the results of walkdowns and spatial interaction screening criteria contained in LRTI-16. The LRTI-16 screening criteria identified specific seismic and spatial interactions that the applicant considered to be credible means for non-safety-related SSCs to adversely interact with safety-related equipment.

- In situations where non-safety-related piping physically connected to a safety-related system, the portion of the non-safety-related system providing structural support to the safety-related system was included within the scope of the rule up to the point where the non-safety-related system was anchored in three dimensions.

The staff reviewed the applicant's scoping methodology, as described in the LRA and associated implementation procedures, to verify that it was consistent with the guidance provided in NUREG-1800 and related staff positions. Additionally, during the scoping methodology audit, the staff reviewed a sampling of scoping results to determine if the methodology adequately identified non-safety-related SSCs meeting the scoping criteria of 10 CFR 54.4(a)(2). Based on a review of the LRA, the applicant's scoping and screening implementation procedures, and discussions with the applicant, the staff determined that additional information was required to assess certain aspects of the applicant's scoping methodology for the 10 CFR 54.4(a)(2) criteria. In RAI 2.1-2, the staff requested the applicant to address the following five issues:

(a) In LRA Section 2.1.2.2, "Title 10 CFR 54.4(a)(2) - Non-safety-related affecting safety-related," the applicant stated that plant walkdowns were performed to identify those areas containing safety-related SSCs. The applicant further stated in LRA Section 2.1.2.2 that, in those instances where a plant walkdown could not be performed, plant drawings were used to identify those areas containing safety-related SSCs and to identify component interactions. For areas where walkdowns could not be performed to identify non-safety-related SSCs that could affect safety-related SSCs, the staff requested the applicant to describe the methodology and documentation sources used to perform scoping pursuant to 10 CFR 54.4(a)(2).

    In its October 3, 2003, response to RAI 2.1-2.a, the applicant provided a listing of plant areas where plant drawings were used to identify spatial interactions rather than a physical area walkdown. Controlled plant piping layout drawings for the various elevations of the plant were used to identify those areas containing safety-related SSCs and to identify component interactions. Controlled electrical/instrumentation physical layout drawings were also used to aid in the identification of safety-related components in the areas. The applicant stated that this review of controlled plant drawings was only performed for high-radiation areas where personnel entry at power operation would have resulted in an unnecessary accumulation of dose. The staff determined that the applicant provided a reasonable basis for not performing physical walkdowns for the identified areas of the plant. Further, the use of controlled plant piping layout and electrical/instrumentation plant drawings was a reasonable method for identifying potential spatial interactions for these areas. On this basis, the staff concluded that RAI 2.1-2.a is resolved.

(b) Instruction LRTI-16, "Identification of Non Safety-related Structures and Components Which Spatially or Structurally Interact With Safety-related Systems," describes the process used to identify non-safety-related systems and components which meet the scoping criteria specified in 10 CFR 54.4(a)(2) due to spatial or structural interaction with safety-related systems. Section 4.3 of LRTI-16 states that non-safety-related systems were evaluated using the screening criteria provided in LRTI-16, Table 2, "Spatial Interaction Screening Criteria." The staff requested the applicant to describe the basis and/or provide justification for the use of the following spatial interaction screening criteria contained in LRTI-16, Table 2:

    - Pipe whip and jet impingement apply only to high-energy systems containing fluids with temperatures greater than or equal to 200 °F and a pressure greater than or equal to 275 psig (LRTI-16, Table 2, Item 5). The staff noted that this definition of high-energy systems appeared to be inconsistent with the CLB definition of a high-energy system as described in the Dresden UFSAR, Section 3.6.1.1.1.1, which indicated that a fluid was high energy when the temperature exceeds 200 °F or the pressure exceeds 275 psig.

- Spray from high-energy systems can affect equipment up to 25 feet (LRTI-16, Table 2, Item 10).

- Cables in conduit or trays are not affected by water spray as long as the spray does not target a cable termination area (LRTI-16, Table 2, Item 4).

- Spray from medium-/low-energy systems can affect equipment up to 20 feet (LRTI-16, Table 2, Item 11). The applicant defined medium-/low-energy systems as any system that did not meet the definition of a high-energy system.

- Early detection of leaks (sumps and floor drain systems) is given credit in the scope of the rule for preventing long-term degradation of passive equipment and flooding beyond the lowest elevation of the building (LRTI-16, Table 2, Item 8).

- Fluid spray can affect only active components (LRTI-16, Table 2, Item 6).

In its October 3, 2003, response to RAI 2.1-2.b, the applicant provided additional information relating to each of the above spatial interaction screening criteria.

High-Energy System Definition and Scoping

The applicant stated that the definition of a high-energy system used during scoping and screening evaluations was consistent with the specific licensing basis at each site. Consequently, Quad Cities defined a high-energy system as a system where the temperature and pressure conditions of fluid exceed 200 °F and 275 psig, respectively, while Dresden defined a high-energy system as one where the temperature or pressure conditions of fluid exceed 200 °F and 275 psig, respectively. The applicant indicated that all systems meeting the plant-specific licensing basis definition of a high-energy system at each site were evaluated for spatial interactions.

In its response to the RAI, the applicant did not justify the use of the 25-foot separation criterion but instead revised the scoping methodology to consider potential spatial interactions between high-energy systems and safety-related SSCs separated by more than 25 feet. The applicant stated that all high energy piping located inside the primary containment was safety-related and included within the scope of license renewal under 10 CFR 54.4(a)(1) scoping criteria. For high energy piping located outside the primary containment, the applicant re-evaluated the scoping boundaries for the following high-energy systems to account for potential spatial interactions:

- main steam
- feedwater
- high pressure coolant injection
- reactor water cleanup
- reactor core isolation cooling (Quad Cities only)
- isolation condenser (Dresden only)
- extraction steam to heaters A, B, C, or D
- heater drain from heater C or D
- condensate booster lines
- moisture separator drain

- control rod drive hydraulic system

As a result of this re-evaluation, the applicant expanded the scoping boundaries of the main steam, feedwater, reactor water cleanup (RWCU), and control rod drive (CRD) systems. The applicant stated that the expanded boundaries are now consistent with the scope of high-energy line breaks analyzed in the CLB and described in Appendix 3A of the UFSAR for both sites. The staff evaluation mechanical system scoping results and aging management programs (AMPs) associated with these expanded boundaries are described in Sections 2.3.1 and 3.1 of this report. The staff concluded that the applicant's scoping methodology for high-energy systems was consistent with the plant-specific licensing bases for the Dresden and Quad Cities sites and considered an adequate scope of potential spatial interactions.

Fluid Spray Interactions with Cables

In its October 3, 2003, response to RAI 2.1-2.b, the applicant stated that the technical justification for the assumption that cables in conduit or trays are not affected by water spray is that the cables are protected by the cable insulation and jacketing. The applicant also noted that cable pan covers and conduit provide additional protection of cable from water spray. The staff concluded that the applicant provided a reasonable basis for its approach to the scoping of cables in conduit or trays.

Fluid Spray Interactions and Flooding

In its October 3, 2003, response to RAI 2.1-2.b, the applicant stated that the only spatial interactions attributed to moderate-/low-energy systems were water spray, flooding, and falling of piping components onto safety-related components. Furthermore, the applicant stated that portions of low-/moderate-energy pipe located directly over a safety-related component (active or passive) were included within the scope of license renewal regardless of the distance separating the two systems. However, the applicant used a separation criterion of 20 feet when evaluating the potential effects of spray. Therefore, spatial interactions were considered only for those portions of low- or moderate-energy non-safety-related systems separated by less than 20 feet from an active safety-related component. In reviewing the RAI response, the staff determined that the applicant's primary basis for this position was the assumption that fluid sprays dissipate over distance, and degradation of low-or moderate-energy systems would occur gradually over time. The applicant stated that any early leakage would be detected and corrected by plant personnel through rounds, inspections, and monitoring of sumps before the aging mechanisms such as corrosion can have an adverse effect. The applicant used a similar basis for the assumption that early detection of leakage would prevent long-term degradation of passive components. Consequently, the applicant assumed that fluid sprays could affect only active components.

The staff concluded that the applicant's basis relied on the assumption that the exposure duration of a non-safety SSC failure would be limited by early detection of leakage through operator actions. However, as discussed in a March 21, 2003, letter to NEI regarding staff comments to proposed industry guidance on 10 CFR 54.4(a)(2) scoping, neither the license renewal rule nor the associated statements of consideration examine duration of the failure as a factor in determining whether a non-safety-related SSC should be in scope. Therefore, the staff determined that the applicant did not provide a sufficient basis for limiting consideration of fluid spray interactions to only those non-safety-related SSCs located within 20 feet of an active safety-related SSC. In particular, the staff requires additional clarification regarding the capability of active and passive safety-related SSCs located greater than 20 feet from a potential spray source to tolerate wetting, the specific operating experience that was relied upon to determine that it was not credible for fluid sprays to affect equipment greater than 20 feet from a failure location, specific methods to detect leakage in normally accessible and inaccessible areas, and justification for use of exposure duration in limiting the scope of potential failure mechanisms considered during scoping. This issue was identified as Open Item 2.1-1.

The applicant responded to Open Item 2.1-1 by letters dated April 9, 2004 and May 18, 2004 (ADAMS Accession Nos. ML041070456, and ML041480178). In addressing this open item, the applicant revised the scoping methodology for non-safety-related moderate energy piping systems that have the potential to interact spatially with safety-related systems. Specifically, the applicant eliminated the 20 foot separation criterion and credit for the early detection of leakage that was previously used to exclude certain moderate energy non-safety-related piping and components from the scope of license renewal. The revised methodology assumes that all safety-related components, active as well as passive, could be adversely affected by spray or wetting from a non-safety moderate energy system located in the same general area of the plant. Therefore, the applicant stated that all components from moderate energy non-safety-related systems located in the same general area as a safety-related component (active or passive) would be included within the scope of license renewal. The applicant defined "General area" as the same floor (elevation) of a major building with no barrier walls between the fluid source and the safety-related component. Barrier walls were defined as barriers that form the boundary of a room on the same elevation of a major building separating the safety-related components from a spray or leak generated by a non-safety-related component located on the other side of the barrier wall. The applicant stated that all barrier walls credited for protection of safety-related components were previously included within the scope of license renewal during structural scoping and subject to aging management review.

In accordance with the revised methodology, the applicant expanded the license renewal boundaries of 17 systems previously determined to be within the scope of license renewal and identified an additional intended function for the main condenser at Quad Cities. Additionally, the applicant added the following five non-safety-related systems to the scope of license renewal that were previously excluded from the scope of license renewal: circulating water (Dresden and Quad Cities), laundry (Dresden), zinc addition (Dresden and Quad Cities), extraction steam (Quad Cities), and feedwater heater vents and drains (Quad Cities) . In its May 18, 2004 response to Open Item 2.1-1, the applicant identified LRA revisions, scoping results changes, and aging management program changes required as a result of the scoping methodology revision. The staff review of these revised scoping results and associated aging management programs are described in Sections 2.3 and 3.1 of this report.

On the basis of the above, the staff concludes that the applicant adequately resolved the issues identified in Open Item 2.1-1. Specifically, the elimination of the 20-foot limitation on spray interactions, consideration of potential adverse effects for both active and passive safety-related equipment, and elimination of credit for early detection of leakage adequately addressed the staff's methodology concerns. Furthermore, the staff determined that the applicant's revised methodology considered a reasonable spectrum of potential non-safety-related spatial interactions with safety-related equipment. Therefore, the staff concludes that the revised methodology for scoping non-safety-related equipment provides reasonable assurance that the applicant considered non-safety-related SSCs whose failure could prevent satisfactory accomplishment of a safety-related intended function within the scope of license renewal. On this basis, Open Item 2.1-1 is resolved. Furthermore, the applicant adequately resolved the staff concerns raised in RAI 2.1-2.b; therefore, RAI 2.1-2.b is resolved.

(c) Section 2.1.2.2 of the LRA states that pipe whip, jet impingement, general flooding, or spray of a gas were not considered credible interactions for gas systems to adversely affect safety-related SSCs. In LRTI-16, Table 2, Item 3 states, "while falling equipment from gas systems can spatially impact safety-related components located below them, the only credible manner in which equipment can fall is through failure of the attached supports." The staff position described in the letter dated March 15, 2003 is that applicant should not consider hypothetical failures, but rather should base their evaluation on the plant's CLB, engineering judgment and analyses, and relevant operating experience. The staff requested that the applicant describe the scoping methodology implemented for the evaluation of the 10 CFR 54.4(a)(2) criteria, including a description of the site and industry operating experience used, as it relates to the non-fluid-filled SSCs of interest and its consistency with the staff position documented in the staff's letter dated March 15, 2003.

In its October 3, 2003, response to RAI 2.1-2.c, the applicant stated that pipe whip, jet impingement, general flooding, or spray of a gas were not considered credible interactions for non-safety-related gas systems to adversely affect safety-related SSCs. The applicant's basis for this assumption was that gas systems contain no fluids that could spray or leak onto safety-related systems causing shorts or other malfunctions and gas systems do not contain sufficient energy to cause pipe whip or jet impingement. Additionally, the applicant considered that the falling of gas-filled pipe components onto safety-related equipment was not a credible spatial interaction unless the attached piping supports were to fail. This latter assumption was based on an operating experience review that included a review of NRC information notices, NRC Office of Inspection and Enforcement (IE) bulletins, generic letters, and plant-specific condition reports, work order history, and self assessments. The applicant stated that no instances of gas-filled piping or component degradation resulting in the falling of components were identified. For this reason, the applicant stated that the pipe supports for gas systems were included within the scope of license renewal, but the gas system piping and valves were not included in the scope of license renewal. The staff determined that the applicant performed a sufficient operating experience review to determine credible spatial effects between non-safety-related gas-filled systems and safety-related SSCs. Therefore, the staff concluded that the applicant's scoping approach for gas-filled systems was reasonable and RAI 2.1-2.c is resolved.

(d) As described in the staff's letter dated March 15, 2003, if an applicant uses a mitigative option when performing the scoping of non-safety-related SSCs under 10 CFR 54.4(a)(2), the applicant should demonstrate that plant mitigative features are adequate to protect safety-related SSCs from non-safety-related SSC failures, regardless of failure location. If an applicant cannot demonstrate that the mitigative features are adequate to protect safety-related SSCs from the consequences of non-safety-related SSC failures, then the entire non-safety-related SSCs is required to be brought into the scope of license renewal.

In reviewing the LRA, the NRC staff was unable to determine if the 10 CFR 54.4(a)(2) scoping methodology considered failures at all piping locations where age-related degradation is possible. The staff requested the applicant to clarify how the scoping methodology of non-safety-related piping was performed relative to the guidance contained in the staff's letter dated March 15, 2003.

In its October 3, 2003, response to RAI 2.1-2.d, the applicant stated that plant mitigative features were not credited with protecting safety-related SSCs from failures of non-safety-related SSCs. Those portions of non-safety-related SSCs that could spatially or structurally interact with a safety-related SSCs in such a manner that would prevent the accomplishment of a safety-related SSCs intended function were included within the scope of license renewal. Based on this response, the staff concluded that the applicant considered an adequate scope of non-safety-related SSC failure locations during license renewal scoping and RAI 2.1-2.d is resolved.

(e) In discussions with the applicant's license renewal project team, the NRC staff noted some cases where non-safety-related plant equipment was credited with providing anchorage for non-safety-related piping that was attached to safety-related piping. In these cases, the non-safety-related piping was placed within the scope of license renewal, but the plant equipment providing structural support was not considered to be within scope. For cases in which an entire pipe run including both safety- and non-safety-related piping was analyzed as part of the CLB to establish that it could withstand design-basis event loads, NUREG-1800, Section 2.1.3.1.2, indicates that the scoping methodology includes (1) the non-safety-related piping up to its anchors and (2) the associated piping anchors as being within the scope of license renewal under 10 CFR 54.4(a)(2). Because the plant equipment credited with providing support to non-safety-related piping within the scope of license renewal appears to be equivalent to an associated piping anchor as described in NUREG-1800, the staff requested the applicant to provide justification for not including this plant equipment within the scope of license renewal in RAI 2.1-2.e.

In its October 3, 2003, response to RAI 2.1-2.e, the applicant stated that it conservatively included those portions of non-safety-related pipe up to the point where the pipe was restrained in three orthogonal directions. The scoping boundary was determined through a review of isometric pipe drawings. In those instances where isometric drawings of non-safety-related pipe did not exist (typically small bore pipe less than 2.5 in. in diameter), the applicant either included the entire line up to the end of the pipe run (e.g., no more pipe existed) or ended the boundary where the line attached to a larger piping header or a major component (i.e., pump or heat exchanger). The larger piping header or major component was treated as an anchor. However, the applicant stated that the major component was excluded from the scope of license renewal because all pipe supports installed in the plant were included within the scope of license renewal.

The staff determined that the applicant did not provide a sufficient basis for excluding major components credited with providing a pipe support function from the scope of license renewal. The staff concluded that major components that ensure satisfactory accomplishment of a safety-related function by providing support to non-safety-related piping attached to safety-related systems should be included within the scope of license renewal. The staff noted that the intended function performed by these major components is similar to that performed by pipe supports. In a supplement to their RAI 2.1-2.e response dated December 22, 2003, the applicant stated that, as a result of further review, these major components have been added into the scope of license renewal as non-structural components that provide non-safety-related anchorage. In this supplemental RAI response, the applicant also provided a listing of specific components added to the scope of license renewal and identified a new component group for non-structural components providing non-safety-related anchorage. The staff evaluations of the mechanical system scoping results and aging management programs associated with the component scoping additions are described in Sections 2.3.1 and 3.1, of this report. Based on inclusion of non-safety-related components credited with providing support to non-safety-related piping attached to safety-related systems within the scope of license renewal, RAI 2.1-2.e is resolved.

A related non-safety-related piping anchorage issue was identified during the Regional scoping and screening inspection documented in NRC Inspection Report Nos. 50-237/03-04(DRS), 50-249/03-04(DRS), 50-254/03-04(DRS), 50-265/03-04 (DRS), dated September 15, 2003. During that inspection, the inspectors questioned the applicant's definition of an equivalent anchor as used to determine the extent of non-safety-related attached to safety-related systems that were included within the scope of the license renewal. Specifically, the applicant included non-safety-related piping attached to safety-related pipe up to the point where the non-safety-related piping was restrained in three orthogonal directions. In a letter dated October 20, 2003, the staff requested the applicant to clarify whether this methodology was consistent with the applicable plant's CLB. Additionally, the staff requested justification that would demonstrate that failure of the non-safety-related piping that was potentially excluded from the scope of license renewal would not adversely impact the safety-related portion of the piping system in accordance with 10 CFR 54.4(a)(2). This issue is identified as Open Item (50-237/03-04-01; 50-249/03-04-01; 50-254/03-04-01; 50-265/03-04-01).

By a letter dated March 25, 2004 (ADAMS Accession No. ML040900466), the applicant responded to Open Item 50-237/03-04(DRS); 50-249/03-04(DRS); 50-254/03-04(DRS); 50-265/03-04 (DRS). In its response, the applicant stated that piping at Dresden and Quad Cities was designed in accordance with United States of American Standard (USAS) B31.1 Code, 1967 Edition. The applicant noted that the CLB for Dresden and Quad Cities states that the boundaries of the piping system model used in the original seismic analysis extended well beyond the stress analysis boundaries set by the first normally closed valves. However, the CLB does not provide any detail concerning how much of the non-safety-related piping beyond the first normally closed valve was included in the analysis. The applicant stated that it performed an additional review of CLB documents to determine the criteria used for these piping analyses. During this review, the applicant identified several isometric drawings used in response to IE Bulletin No. 79-14, "Seismic Analyses for As-Built Safety-Related Piping Systems," which indicated the extent to which the piping analyses included non-safety-related piping. The applicant determined that the isometric drawings imply that the piping analyses most likely included two levels of support in each orthogonal direction on the non-safety-related portion of the piping.

Based on the CLB information supporting the Bulletin 79-14 evaluations, the applicant indicated that the scoping boundary for non-safety-related piping attached to safety-related equipment should have been extended up to and including two levels of support in each of the three orthogonal directions. Therefore, the applicant reviewed license renewal system boundary diagrams and piping isometrics to determine which non-safety-related piping license renewal boundaries needed to be expanded to encompass this degree of restraint. For non-safety-related piping attached to large bore (10 in. or larger) safety-related pipe, the applicant license renewal boundary expanded for several systems, including: condensate and condensate storage (Dresden), high pressure coolant injection (Dresden and Quad Cities), reactor building closed water cooling (Quad Cities), residual heat removal (Quad Cities), service water (Quad Cities), and reactor recirculation (Quad Cities). For small bore pipe, the applicant stated that the original scoping of piping less than 10 inches in diameter typically included the entire line. However, the applicant identified some additional non-safety-related small bore piping which needed to be added to the scope of license renewal as a result of this effort, including piping in the following systems: reactor building closed cooling water (Dresden), isolation condenser (Dresden), nuclear boiler instrumentation (Dresden), control rod drive hydraulic (Dresden and Quad Cities), high pressure coolant injection (Dresden), containment isolation (Dresden and Quad), condensate and condensate storage (Quad Cities), diesel generator cooling (Quad Cities), reactor recirculation (Quad Cities), residual heat removal (Quad Cities), and standby liquid control (Quad Cities). The applicant determined that the components added to the scope of license renewal as a result of these additional reviews were comprised of the same material and environmental combinations as other components previously assessed for aging management. Consequently, the applicant concluded that no new aging management programs were required. However, because the applicant identified certain component types that had not been previously identified in the scoping results described in the LRA, the applicant revised certain LRA Chapter 2 aging management review tables. In their response, the applicant provided a summary of the necessary revisions to the affected tables. The staff review of the additional equipment added to the scope of license renewal and the associated aging management programs are discussed in Sections 2.1 and 3.1 of this report.

On the basis of its review, the staff finds that the applicant's method as described above is reasonable and acceptable because the applicant's response to IE Bulletin 79-14 verified that the actual configuration of the piping systems meets the design requirements, and the staff has previously reviewed the response and found it acceptable. As documented in NRC Inspection Report 50-237/83-23; 50-249/83-20; 50-254/83-22; 50-265/83-21, dated September 9, 1983 (ADAMS Accession No. 8309210296), the NRC staff previously concluded that all pertinent issues and findings relative to IE Bulletin 79-14 had been resolved. Therefore, the staff concludes that the extension of the license renewal scoping boundary to two levels of support in each orthogonal direction beyond the safety-non-safety interface provides reasonable assurance that the safety-related portion of piping could withstand design basis event loads. As such, the staff concludes that the applicant's revised scoping methodology for non-safety-related piping attached to safety-related systems is consistent with NUREG-1800 and the staff expectations of the December 3rd and March 15th letters. Therefore, Open Item (50-237/03-04-01; 50-249/03-04-01; 50-254/03-04-01; 50-265/03-04-01) is resolved.

In reviewing the LRA description of non-safety-related scoping, the staff noted that the subsection entitled "Hypothetical Failures and Cascading," located within LRA Section 2.1.6, indicates that only hypothetical failures described in the CLB were considered during SSCs scoping. With regard to failures that should be considered during 10 CFR 54.4(a)(2) scoping, NUREG-1800, Section 2.1.3.1.2, "Non-Safety-Related," states the following:

> The applicant must identify those non-safety-related SSCs (including certain second-, third-, or fourth-level support systems) whose failures are considered in the CLB and could prevent the satisfactory accomplishment of the safety-related function identified under 10 CFR 54.4(a)(1). In order to identify such systems, the applicant should consider those failures identified in (1) the documentation that makes up its CLB, (2) plant-specific operating experience, and (3) industry wide operating experience that is specifically applicable to its facility.

The NRC staff noted that consideration of only hypothetical failures described in the CLB may result in the failure to consider failures identified in plant-specific and industry wide operating experience. Therefore, in RAI 2.1-11, the staff requested the applicant to describe the intent of this statement in the LRA and to discuss how the scoping process considered failures identified in the CLB and plant-specific and industry wide operating experience that is applicable to the Dresden and Quad Cities facilities in a manner consistent with the guidance contained in NUREG-1800.

In its October 3, 2003, response to RAI 2.1-11, the applicant provided additional information regarding its treatment of hypothetical failures during scoping. The applicant stated that instruction GE-NE-LRTI-2000 requires the person performing the scoping review for each system or structure to identify information found in CLB documents and to list this information on the system or structure scoping form. The applicant stated that this process provides reasonable assurance that any CLB requirements dealing with the scoping criteria in 10 CFR 54.4(a)(2) are identified in the scoping process. With respect to credible failures identified in plant-specific and industry wide operating experience, the applicant stated that plant-specific and industry wide operating experience was not specifically reviewed during the scoping process in preparation of the Dresden and Quad Cities LRA. The applicant based this position on the existence of routine Exelon practices for review of operating experience which include an assessment to determine if non-safety-related equipment failures prevented a safety-related function from occurring. The applicant stated these practices would identify appropriate corrective actions to prevent recurrence of any failure of non-safety-related SSCs identified through the routine operating experience reviews. Although the staff agrees that the applicant's scoping methodology would reasonably identify failures considered in the CLB, the staff lacked sufficient information to conclude that the applicant adequately considered operating experience in identifying credible failures. In particular, the staff determined that corrective actions arising from routine operating experience reviews would not necessarily be effective in preventing recurrence of failures identified in site-specific or industry-wide operating experience. Further, the corrective actions arising from these reviews may not address the aging management aspects of the previously experienced failures.

In a supplement to the RAI 2.1-11 response dated December 17, 2003, the applicant clarified their use of operating experience during the scoping of non-safety-related SSCs. The applicant stated that an explicit review of operating experience was not conducted during the initial phase of non-safety-related scoping. However, during the revised non-safety-related scoping phase conducted following the issuance of additional NRC guidance pertaining to the identification and the treatment of SSCs which meet 10 CFR 54.4(a)(2), the applicant stated that operating experience was considered. Specifically, the applicant stated that operating experience items such as NRC documents (information notices, generic letters, violations, and bulletins), 10 CFR Part 21 reports, vendor bulletins, and site operating experience reports were considered during the scoping of non-safety-related SSCs. Based on this supplemental response, the staff concluded that the applicant considered an adequate scope of operating experience when identifying failures that could prevent the satisfactory accomplishment of the safety-related intended functions. Based on the above, RAI 2.1-11 is resolved.

Based on a review of the LRA and related scoping implementation procedures, discussions with the applicant, and a sampling of scoping results, the staff determined that the applicant's methodology for scoping non-safety-related equipment under 10 CFR 54.4(a)(2) adequately identified those non-safety-related SSCs whose failures could prevent the satisfactory accomplishment of the safety-related functions identified under 10 CFR 54.4(a)(1). Therefore, the staff determined that the applicant's methodology for identifying systems and structures meeting the scoping criteria of 10 CFR 54.4(a)(2) was adequate.

Application of the Scoping Criteria in 10 CFR 54.4(a)(3). In part, 10 CFR 54.4(a)(3) requires that the applicant consider all SSCs 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) to be within the scope of the license renewal. Because the pressurized thermal shock requirements of 10 CFR 50.61 apply only to pressurized water reactors, the 10 CFR 54.4(a)(3) scoping criteria related to 10 CFR 50.61 are not applicable to the Quad Cities and Dresden Nuclear Power Stations, which are boiling water reactors.

The applicant's methodology for performing the scoping of SSCs in accordance with 10 CFR 54.4(a)(3) was documented in implementation procedures GE-NE-LRTI-2000 and the Scoping and Screening Desktop Guide. Additionally, the applicant prepared technical position papers for each regulated event applicable to the Dresden and Quad Cities Nuclear Power Stations to support the scoping process.

The applicant performed the initial scoping for regulated events using general screening checklist questions in Section 4.1.4 of procedure GE-NE-LRTI-2000 to identify if the structure or system met the scoping criteria of 10 CFR 54.4(a)(3). Section 3 of the Scoping and Screening Desktop Guide indicated that the GE-NE-LRTI-2000 checklist questions could be answered by reviewing the technical position papers to determine if a system or structure was relied on to demonstrate compliance with any of the regulated events listed in 10 CFR 54.4(a)(3). During the scoping and screening methodology audit, the applicant stated that use of the position papers ensured consistent scoping results and eliminated the need to review CLB documents when evaluating each plant structure or system against the 10 CFR 54.4(a)(3) scoping criteria. The staff noted that Section 2.1.3.5 of the LRA identified technical position papers as a documentation source for license renewal scoping under 10 CFR 54.4(a)(3). However, in reviewing the LRA and scoping and screening implementation procedures, the NRC staff was unable to determine the extent that the CLB was reviewed during position paper development. NUREG-1800, Section 2.1.3.1.3, "Regulated Events," states that all SSCs that are relied upon in the plant's CLB, plant-specific experience, industry wide experience (as appropriate), and safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations identified under 10 CFR 54.4(a)(3), are required to be included within the scope of the rule. Therefore, in RAI 2.1-6, the staff requested the applicant to provide a description of the methodology used to develop technical position papers and clarification regarding the process used to identify the SSCs intended functions related to the mitigation of regulated events.

In its October 3, 2003, response, the applicant stated that the regulated event position papers were prepared by engineers who had previous experience with BWR systems and operations. The preparer reviewed applicable CLB documents to identify systems required in each regulated event. The applicant noted that position papers also identified system functions explicitly credited for regulated events. A reviewer, who had not been directly involved in the preparation of the paper, checked the position paper for accuracy and completeness. After preparation and review, the position papers were approved by license renewal project management and issued for use. Position papers were revised using a similar preparation-review-approval process. In its RAI response, the applicant identified supporting CLB documentation and described an electronic document database used in the development of the position papers. The staff determined that the scope of documentation reviewed for the development of the position papers and the control of the position paper development process were adequate to provide reasonable assurance that the applicant identified SSCs and associated intended functions for regulated events. Therefore, based on the above, the staff resolved RAI 2.1-6.

In Section 2.1.6 of the LRA, the applicant stated that when a supporting system or structure was identified for an intended function that satisfies only criterion 10 CFR 54.4(a)(3), the scoping process did not require that the supporting function be classified as an intended function unless a requirement in a CLB document explicitly identifies a requirement for the supporting function. Per 10 CFR 54.4(a)(3), all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with specific regulated events must be within the scope of license renewal. In reviewing the LRA and supporting implementation procedures, the staff was unable to determine how the applicant's guidance for scoping support systems to equipment credited for demonstrating compliance with the Section 54.4(a)(3) regulated events was implemented. In particular, the staff questioned if support functions that were not explicitly identified by a CLB requirement but still required to demonstrate compliance with a regulated event were considered within the scope of license renewal. Therefore, in RAI 2.1-9, the staff asked the applicant to describe the intent and basis for the support function scoping guidance in Section 2.1.6 of the LRA and the extent of CLB reviews conducted to identify support functions to structures and systems meeting the scoping criteria of 10 CFR 54.4(a)(3).

In its October 3, 2003, response, the applicant stated that the discussion in LRA Section 2.1.6 should have been written as follows:

> When a supporting system or structure was identified for an intended function that satisfies only criterion 10 CFR 54.4(a)(3), the scoping process did not require that the supporting function be classified as an intended function unless (1) failure of the supporting system or structure is expected to cause failure of the intended function satisfying criterion 10 CFR 54.4(a)(3), or (2) a requirement in a current licensing basis documented explicitly identifies a requirement for the supporting function.

The applicant also noted that the scoping process for systems and structures satisfying 10 CFR 54.4(a)(1) through (3) required that any supporting system function be identified as a license renewal "intended function" if its failure would prevent the supported system from performing any of its intended functions. The review to identify support functions of SSCs within the scope of license renewal consisted of reviewing the UFSARs, system design-basis documents, system operating description documents (operator lesson plans and procedures), and, where necessary, engineering drawings related to the system to identify interfaces with other systems and any required support provided by the interfacing system. Based on this review, the applicant stated that critical supporting functions, such as those provided by power supplies or required cooling water subsystems, were identified. The supporting functions were classified as license renewal intended functions if their failure was expected to cause failure of a supported intended function. The staff determined that the applicant's approach to scoping of support systems adequately ensured that all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with regulated events would be included within the scope of license renewal. Therefore, the staff resolved RAI 2.1-9.

In an April 1, 2002, letter from Mr. D. Matthews to Mr. A. Nelson and Mr. D. Lochbaum, the staff provided guidance on the scoping of equipment relied on to meet the requirements off the station blackout (SBO) rule, 10 CFR 50.63. In this letter, the staff noted that, consistent with the requirements specified in 10 CFR 54.4(a)(3) and 10 CFR 50.63(a)(1), the plant system portion of the offsite power system that is used to connect the plant to the offsite power source should be included within the scope of the rule. In Section 2.1.3.5 of the LRA, the applicant stated that the SBO technical position papers include structures and components of the offsite power system for each plant required to restore power from the onsite switchyard down to the safety-related busses in the plant. Furthermore, the applicant stated that the plant offsite power system and these structures and components were classified as satisfying criteria 10 CFR 54.4(a)(3) and were included within the scope of license renewal. The staff determined that the applicant's approach to scoping SSCs relied on to demonstrate compliance with the SBO rule (10 CFR 50.63) was consistent with the staff's April 1, 2002, interim guidance.

As part of the evaluation of the applicant's scoping methodology, the audit team reviewed a sample of the LR database 10 CFR 54.4(a)(3) scoping results to assess the adequacy of the applicant's scoping methodology. The staff verified that the applicant's scoping methodology identified and used pertinent engineering and licensing information in order to determine the SSCs required to be in scope in accordance with the 10 CFR 54.4(a)(3) criteria. Therefore, the staff determined that the applicant's methodology for identifying systems and structures meeting the scoping criteria of 10 CFR 54.4(a)(3) was adequate.

2.1.3.1.3 Plant-Level Scoping of Systems and Structures

The applicant performed the scoping of systems and structures in accordance with implementation procedures GE-NE-LRTI-2000 and the Scoping and Screening Desktop Guide. Procedure GE-NE-LRTI-2000 specified that the personnel performing scoping use CLB documents and list all functions that the system or structure is required to accomplish. System or structure functions were then compared to a list of scoping screening questions contained in Section 4.1.4 of GE-NE-LRTI-2000 to determine whether the functions met the scoping criteria of 10 CFR 54.4(a). Systems or structures with functions meeting one or more of the screening criteria were considered to be within the scope of license renewal. The staff reviewed the screening questions and concluded that the screening questions were consistent with the requirements of 10 CFR 54.4(a).

The applicant documented the results of the plant-level scoping process in accordance with GE-NE-LRTI-2000, Exhibit A, "License Renewal System and Structure Scoping Form." The scoping form included a description of the structure or system, a listing of functions performed by the system or structure, information pertaining to system realignment (as applicable), identification of intended functions, the 10 CFR 54.4(a) scoping criteria met by the system or structure, references, and identification of support systems. During the scoping methodology audit, the staff reviewed a sampling of scoping reports and concluded that the applicant's scoping forms contained an appropriate level of detail to document the scoping process.

Based on a review of the LRA, the scoping and screening implementation procedures, and a sampling review of system and structure scoping results during the methodology audit, the staff concluded that the applicant's scoping methodology for systems and structures was adequate. In particular, the staff determined that the applicant's methodology reasonably identified systems and structures within the scope of license renewal and their associated intended functions. Additionally, the applicant's approach to system and structure scoping was consistent with the methodology described in Section 2.1.4 of the LRA.

2.1.3.1.4 Component-Level Scoping

After the applicant identified systems and structures within the scope of licensee renewal and their associated intended functions, a review was performed to identify the components of each in-scope system and structure that supported an intended function. As described in Section 2.1.4.1 of the LRA, a component was determined to be in scope if it was safety-related, meeting the criteria of 10 CFR 54.4(a)(1); if it was determined that the component was needed to fulfill a system intended function; if the component met the criteria of 10 CFR 54.4(a)(2); or if the component was needed to demonstrate compliance with a regulated event.

To facilitate the scoping and screening process and AMRs, the applicant realigned certain components from their actual parent system to a different LR system. Attachment 1 of GE-NE-LRTI-2000 described the process used by the applicant to realign components from one system to another for the purposes of LR scoping. This guidance allowed alignment of components to a system more closely associated with their intended functions when all but a few components in the parent system were outside the scope of license renewal. Component realignment was intended to allow components to be evaluated as a coherent functional group within an appropriate system or commodity group. The implementation procedure included documentation requirements to permit traceability of components that were realigned from one parent system to a different LR system. During the scoping and screening methodology audit, the staff reviewed the implementation of this component realignment guidance and determined that the realignment process did not adversely impact component-level scoping and screening.

Mechanical Component Scoping. Section 4.3, "Scoping and Screening of System Components," of GE-NE-LRTI-2000 provided the applicant's proceduralized guidance for scoping mechanical system components. The applicant initially generated a listing of mechanical system components based on information contained in the EWCS database. This information was augmented by a review of the system LR boundary diagram to identify system components not included in the EWCS database or generic components such as piping and tubing that were applicable to the system. Following identification of all system components, the applicant used the LR boundary diagrams as an aid to evaluate each component against the scoping criteria of 10 CFR 54.4(a). System components meeting the criteria of 10 CFR 54.4(a) were classified as within the scope of license renewal.

The applicant provided guidance for the scoping of equipment insulation in Section 9.7 of the Scoping and Screening Desktop Guide and position paper PP-QDC-DRE- Revision 00 IN. Based on information contained in the insulated line list specification for each plant site, the applicant determined which piping system had insulation installed. For each pipe system with installed insulation, the applicant created a generic insulation component in the system component list. The generic insulation component was then realigned to the generic insulation system, which is described in LRA Section 2.4.16, "Insulation Commodity Group." The applicant stated that all insulation was initially considered within the scope of license renewal but that the scoping classification could be revised based on further evaluation of its design function during an aging management review.

During the scoping and screening methodology audit, the staff reviewed a sampling of scoping results to verify that the applicant's proceduralized methodology was adequately implemented. In performing this review, the staff noted a potential inconsistency in the scoping results for the refueling equipment system and the applicant's mechanical system scoping methodology. LRA Section 2.3.3.1, "Refueling Equipment," identified two system-level intended functions for the refueling equipment system—(1) maintain structural integrity to prevent collapse of the platform onto the spent fuel storage racks or the reactor core and (2) provide interlocks to preclude inadvertent criticality. LRA Table 2.3.3-1, "Component Groups Requiring Aging Management Review—Refueling Equipment System," identified the spent fuel gates as requiring aging management to maintain a "pressure boundary" component-level intended function. Based on a review of LRA Section 2.3.3.1, the NRC staff was unable to determine how the pressure boundary component-level function for the spent fuel pool gates supported either of the refueling equipment system-level intended functions in a manner consistent with the component scoping methodology described in Section 2.1.4.1 of the LRA. In RAI 2.1-10, the staff requested that the applicant describe how the scoping methodology was implemented to identify the need for spent fuel gate pressure boundary integrity to support the specified refueling equipment system intended functions. The staff did not identify additional inconsistencies during the mechanical scoping results review.

In its October 3, 2003, response to RAI 2.1-10, the applicant stated that component intended function for the spent fuel pool gates was properly classified as pressure boundary and properly evaluated for aging management. The gates were included in the refueling equipment system because the original equipment supplier included them in the list of refueling equipment provided to the station. After further review, the applicant has stated that it would have been more appropriate to place the fuel pool gates, with pressure boundary intended function, into the Reactor Building system, along with the fuel pool structure. However, the staff concluded that the appropriate intended function of the spent fuel pool gates was identified by the applicant's scoping process, and evaluation of the spent fuel pool gate with the refueling equipment system rather than the reactor building system was an isolated example and did not indicate a significant deficiency in the implementation of the scoping methodology. Consequently, the staff resolved RAI 2.1-10.

The staff determined that the applicant's proceduralized methodology was consistent with the description provided in Section 2.1.4.1 of the LRA and the guidance contained in NUREG-1800, Section 2.1, and was adequately implemented. After reviewing the applicant's detailed scoping implementation procedures and a sample of the mechanical components scoping results, the staff concluded the applicant's methodology for identifying mechanical components within the scope of license renewal met the requirements of 10 CFR 54.4(a).

<u>Structural Component Scoping</u>. Section 4.2, "Scoping and Screening of Structural Components," of GE-NE-LRTI-2000 provided the applicant's proceduralized guidance for

scoping structural components. For all structures within the scope of license renewal, the applicant stated that an initial listing of structural components was generated based on information derived from the EWCS database. Because the EWCS does not identify all components within a given structure, the applicant augmented the component list with generic component types applicable to the structure. In Section 2.1.4.3 of the LRA, the applicant stated that detailed structural drawings and, where needed, walkdowns were performed to identify structural elements. Generic structural component types were selected from Table 5, "Generic Structural and Mechanical System Components," of GE-NE-LRTI-2000. The staff compared the applicant's generic structural component listing to the typical structural commodity groups identified in Table 2.1-5 of NUREG-1800 and concluded that the applicant's general structural component list was reasonable. Following identification of all system components, the applicant evaluated each component against the scoping criteria of 10 CFR 54.4(a). Structural components meeting the criteria of 10 CFR 54.4(a) were classified as within the scope of license renewal.

The staff determined that the applicant's proceduralized methodology was consistent with the description provided in Section 2.1.4.3 of the LRA and the guidance contained in NUREG-1800, Section 2.1. Based on review of information contained in the LRA, the applicant's detailed scoping implementation procedures, and a sample of the structural component scoping results, the staff concluded that the applicant's methodology for identifying structural components within the scope of license renewal met the requirements of 10 CFR 54.4(a).

Electrical and I&C Component Scoping. The applicant's methodology for scoping electrical and I&C components was described in technical position paper PP-DRE-QDC Revision 01 SPACES, "Scoping and Screening Position Paper for Electrical Components based on Electrical Spaces Approach for Aging Management Review." The electrical scoping methodology initially identified every electrical component as within the scope of license renewal. However, Section 3.0.3 of PP-DRE-QDC Revision 01 SPACES allowed exclusion of electrical components "which are clearly in systems which are not in the license renewal scope, or which are determined by other means to be outside license renewal scope" from the scope of license renewal. During the scoping and screening methodology audit, the applicant's LR project team indicated that electrical components located within certain plant spaces were excluded from LR scope, in addition to some electrical components that did not perform an intended function. Based on a review of the LRA and scoping implementation procedure PP-DRE-QDC Revision 01 SPACES, the NRC staff was unable to determine the applicant's basis for generically excluding electrical and I&C components in certain plant spaces from the scope of license renewal or the specific methods used to determine that an electrical or I&C component was otherwise not within the scope of license renewal.

Section 2.5.3.1, "Components Within the Scope of License Renewal," of NUREG-1800 states that an applicant may use the plant spaces approach in scoping electrical and I&C components. In the plant spaces approach, an applicant may indicate that all electrical and I&C components located within a particular area are either within or not within the scope of license renewal. In NUREG-1800, Table 2.5-1, "Examples of 'Plant Spaces' Approach for Electrical and I&C Scoping and Corresponding Review Procedures," provides guidance for the review of scoping performed in accordance with the plant spaces approach. In particular, if the applicant limits the scope of electrical and I&C components considered within the scope of license renewal by excluding components in certain plant spaces, Table 2.5-1 indicates that this approach should not result in failing to place electrical and I&C components that perform intended functions within the scope of license renewal. Because the staff was unable to determine the applicant's specific basis for excluding certain electrical and I&C components from the scope of license renewal, the staff was unable to evaluate the applicant's electrical spaces approach against the guidance in NUREG-1800. Therefore, to support the staff review of the implementation of the electrical spaces approach, in RAI 2.1-13, the staff requested the applicant to describe the methodology used to exclude electrical equipment located within certain plant spaces from the scope of license renewal.

In its October 3, 2003, response, the applicant stated that all electrical cables and components were considered in the scope of license renewal. The radwaste building, which did not contain any electrical components within the scope of license renewal, was the only space where the electrical components were generically excluded based on location. All electrical systems were evaluated to determine if the system intended functions met the requirements of 10 CFR 54.4(a)(1) through (a)(3). Electrical components, except for cables, that were clearly in systems not in the scope of 10 CFR 54.4(a)(1) through (a)(3) were flagged as not in the scope of license renewal. The remaining electrical components and all of the cables were flagged as being in the scope of license renewal and assigned component intended functions. During the AMR process, the applicant determined that certain cables and components were not safety-related; that failure of these cables or components would not prevent satisfactory accomplishment of any of the intended functions identified in 10 CFR 54.4(a)(1)(i), (ii), or (iii); and that these cables and components performed no functions that demonstrates compliance with fire protection, environmental qualification, anticipated transients without scram, or SBO. Therefore, these cables and components were removed from the scope of license renewal. In reviewing the response to RAI 2.1-13, the staff concluded that the applicant identified an appropriate basis for excluding certain electrical and I&C components from the scope of license renewal. In particular, the staff concluded that the applicant's implementation of the electrical spaces approach provided reasonable assurance that electrical and I&C components that perform intended functions were within the scope of license renewal. Therefore, the staff resolved RAI 2.1-13.

The staff determined that the implementation of the electrical spaces method for scoping of electrical and I&C components was consistent with the guidance contained in NUREG-1800. Because the applicant's use of the electrical spaces approach integrated the scoping and screening phases of the methodology, additional conclusions regarding the use of this method are discussed in Section 2.1.3.2.3 of this report.

2.1.3.2 Screening Methodology

The staff reviewed the screening methodology used by the applicant to determine if mechanical, structural, and electrical components within the scope of license renewal would be subject to further aging management evaluation. The applicant described its screening process in Section 2.1.5 of the LRA. In general, the applicant's screening approach consisted of evaluations to determine which in-scope structures and components were passive and long-lived. Passive, long-lived structures and components were then subject to an AMR.

The staff evaluated the applicant's screening methodology against the criteria contained in 10 CFR 54.21(a)(1) and (a)(2) using the review guidance contained in NUREG-1800, Section 2.1.3.2, "Screening." According to 10 CFR 54.21(a)(1), the applicant's integrated plant assessment must identify and list those structures and components subject to an AMR.

Further, 10 CFR 54.21(a)(1) requires that structures and components subject to an AMR shall encompass those structures and components that (1) perform an intended function, as described in Section 54.4, without moving parts or a change in configuration or properties and (2) are not subject to replacement based on a qualified life or specified time period. Per 10 CFR 54.21(a)(2), the applicant must describe and justify the methods used to meet the requirements of 10 CFR 54.21(a)(1). In the LRA, the applicant described screening methodologies that were unique to the mechanical, structural, and electrical disciplines. The staff evaluation of the applicant's screening approach for each of these disciplines is described below.

2.1.3.2.1 Mechanical Component Screening

The applicant provided procedural guidance for the conduct of mechanical component screening in Section 4.3 of procedure GE-NE-LRTI-2000, position paper PP-DRE-QDC Revision 02-AP, and the Scoping and Screening Desktop Guide. For each mechanical system component determined to be within the scope of license renewal, the applicant identified if the component was active or passive. The classification of a component as either active or passive was based on an active/passive classification component table provided in position paper PP-DRE-QDC Revision 02-AP. In discussions with the applicant during the scoping and screening methodology audit, the staff determined that the component types and active/passive classifications provided in PP-DRE-QDC Revision 02-AP were based on Revision 2 to NEI 95-10, rather than the NRC-endorsed Revision 3. As discussed in Section 2.1.3.1.1 of this SER, the staff evaluated the applicant's use of Revision 2 to NEI 95-10 and determined that the use of the earlier revision did not adversely impact the screening process. After a component was classified as passive, the applicant identified the associated passive component intended functions. The applicant selected component passive intended functions from Table 6, "Passive Component Intended Functions," of GE-NE-LRTI-2000. The staff reviewed the passive intended functions described in Table 6 and determined that the functions were consistent with those described in NUREG-1800, Table 2.1-3, "Typical 'Passive' Structure and Component Intended Functions."

Following classification of an in-scope mechanical system component as passive and identification of the component intended functions, the applicant determined if the component was long-lived. Scoping and screening procedure GE-NE-LRTI-2000, Section 4.3.8, and Table 7, "Short Lived Components Not Requiring Aging Management," provided guidance for determining if a component was long-lived. Specifically, GE-NE-LRTI-2000 Table 7 listed general component types, including consumable items, that did not require an AMR because they were considered to be short-lived. Section 4.3.9 of GE-NE-LRTI-2000 required that all passive, long-lived mechanical system components within the scope of license renewal be subject to an AMR.

In reviewing the LRA and GE-NE-LRTI-2000, the staff was unable to determine the basis for considering some of the components listed in Table 7 to be short-lived and therefore not subject to an AMR. As discussed in NUREG-1800, Table 2.1-3, "Specific Staff Guidance on Screening," states that the applicant should identify the standards that are relied on for replacement of consumables that are not subject to an AMR as part of the methodology description. For consumables such as packing, gaskets, component seals, and O-rings, Table 2.1-3 of NUREG-1800 states that these components may be excluded from an AMR using a clear basis. For consumables such as system filters, fire extinguishers, fire hoses, and air packs, the applicant should identify the standards relied on for replacement as part of the methodology description. Therefore, in RAI 2.1-12, the staff asked the applicant to justify its determination that the component is not subject to an AMR for each of the component types listed in Table 7.

In its October 3, 2003, response to RAI 2.1-12, the applicant provided a justification for each component type listed in Table 7 of GE-NE-LRTI-2000 that is not subject to an AMR. Additionally, the applicant noted that flexible hoses should not have been listed in Table 7. Flexible hoses may be either short-lived or long-lived, depending on whether they are periodically replaced as part of preventative maintenance. The applicant stated that it had recognized the need to revise Table 7 during the transition from the scoping and screening phase to the AMR phase of the integrated plant evaluation. At that time, any in-scope flexible hoses that had been categorized as "short-lived" were re-screened as "long-lived" and were carried forward for AMR. During AMR, flexible hoses screened as "long-lived" could be re-categorized as "short-lived" and excluded from further evaluation provided that a basis for re-categorizing them as "short-lived" was identified and documented in the component comment field of the LR database. In its response, the applicant also identified the AMPs credited with managing the effects of aging for long-lived flexible hoses. The staff determined that the applicant provided a sufficient justification for excluding the component types listed in Table 7 of GE-NE-LRTI-2000, other than flexible hoses, from an AMR. Additionally, the applicant described a reasonable process for the classification of flexible hoses as either short-lived and subject to periodic replacement or long-lived and subject to an AMP. Therefore, on this basis, the staff resolved RAI 2.1-12.

In a May 1, 2002, letter from Dr. P.T. Kuo to Mr. A. Nelson and Mr. D. Lochbaum, the staff provided guidance on the identification and treatment of housings for active components for LR scoping and screening. As discussed in this letter, the staff expects applicants for license renewal to identify active component housings (e.g., housings for fans, dampers, and heating and cooling coils) which require an AMR. This determination should consider whether failure of the housing would result in a failure of the associated active component to perform its function, and whether the housing meets the long-lived and passive criteria as defined in the Rule. During the scoping and screening methodology audit, the applicant stated that this guidance was incorporated into the AMR process. Additionally, the applicant provided several examples where housings of active components were identified as requiring an AMR. These include housings located in the standby gas treatment system (SBGTS); emergency diesel generator (EDG) and auxiliaries; and heating, ventilation, and air conditioning (HVAC)—reactor building. Based on this information, the staff concluded that the applicant appropriately considered the housings of active components in its scoping and screening methodology.

Based on the preceding, the staff determined that the applicant's screening methodology was consistent with the guidance contained in NUREG-1800 and was capable of identifying passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.2 Structural Component Screening

The applicant provided procedural guidance for the conduct of structural component screening in Section 4.2 of procedure GE-NE-LRTI-2000, position paper PP-DRE-QDC Revision 02-AP, and the Scoping and Screening Desktop Guide. For each structural component determined to be within the scope of license renewal, the applicant identified if the component was active or passive. The classification of a component as either active or passive was based on an active/passive classification component table provided in position paper PP-DRE-QDC Revision 02-AP. In addition to the use of the active/passive classification table, Section 4.2.5 of GE-NE-LRTI-2000 stated that the distinct structural features (components) that constitute a structure were considered passive. After a structural component was classified as passive, the applicant identified the related passive structure intended functions. The applicant selected component passive intended functions from Table 6, "Passive Component Intended Functions," of GE-NE-LRTI-2000. The staff reviewed the passive intended functions described in Table 6 and determined that the functions were consistent with those described in NUREG-1800, Table 2.1-3, "Typical 'Passive' Structure and Component Intended Functions."

Following classification of an in-scope structural component as passive and identification of the component intended functions, the applicant determined if the component was long-lived. Scoping and screening procedure GE-NE-LRTI-2000, Section 4.2.7 and Table 7, provided guidance for determining if a structural component was long-lived. Specifically, GE-NE-LRTI-2000 Table 7 listed general component types, including consumable items, that did not require an AMR because they were considered to be short-lived. As discussed in Section 2.1.3.2.1 above, the staff evaluated the applicant's classification of certain generic component types in GE-NE-LRTI-2000 and concluded that the applicant's approach was adequate. Section 4.2.8 of GE-NE-LRTI-2000 required that all passive, long-lived structural components within the scope of license renewal be subject to an AMR.

The staff determined that the applicant's structural component screening methodology was consistent with the guidance contained in NUREG-1800 and was capable of identifying those passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.3 Electrical and I&C Component Screening

As described in Section 2.1.3.1.3 of this SER, the applicant used a plant spaces approach for electrical and I&C scoping and screening. Therefore, the applicant screened electrical and I&C components on a plant-wide basis rather than on a system basis. The applicant described the electrical and I&C screening methodology in Section 2.1.4.2 of the LRA and position paper PP-DRE-QDC Revision 01-SPACES. Although the applicant initially considered all electrical components to be within the scope of license renewal, the scoping and screening methodology allowed electrical and I&C components to be removed from scope. As described in Section 2.1.3.1.3 of this report, the staff requested the applicant to provide additional information regarding the application of the electrical spaces approach with regard to removing electrical equipment from scope. For each electrical component within the scope of license renewal, the applicant determined if the component was active or passive based on component classifications listed in Attachment 1 to position paper PP-DRE-QDC Revision 01-SPACES. In discussions with the applicant during the scoping and screening methodology audit, the staff determined that the component types and active/passive classifications provided in PP-DRE-QDC Revision 01-SPACES were based on Revision 2 to NEI 95-10, rather than on the NRC-endorsed Revision 3. As discussed in SER Section 2.1.3.1.1 above, the staff evaluated the applicant's use of Revision 2 to NEI 95-10 and determined that the use of the earlier revision did not adversely impact the screening process. Following identification of passive electrical and I&C electrical components, for each component the applicant identified if the component was long-lived. Passive, long-lived electrical and I&C components within the scope of license renewal were then subject to an AMR. In Section 2.5 of the LRA, the applicant identified electrical and I&C commodity groups subject to an AMR, including (1) cables and connections (splices, connectors, fuse blocks, and terminal blocks), (2) bus ducts, (3) high-voltage transmission conductors and insulators, and (4) electrical penetrations. The staff determined that the applicant's selection of electrical and I&C commodity groupings was consistent with NUREG-1800.

The staff also reviewed the applicant's approach to scoping and screening of electrical fuse holders. In license renewal ISG-5, "Identification and Treatment of Electrical Fuse Holders for License Renewal," dated March 10, 2003, the staff stated that, consistent with the requirements specified in 10 CFR 54.4(a), fuse holders (including fuse clips and fuse blocks) are considered to be passive electrical components. Fuse holders would be scoped, screened, and included in the AMR in the same manner as terminal blocks and other types of electrical connections that are currently being treated in the process. This staff position applies only to fuse holders that are not part of a larger assembly, but support safety-related and non-safety-related functions in which the failure of a fuse holder precludes an intended function from being accomplished. As described in LRA Section 2.5.1.1, "Cables and Connections," all electrical insulated cables and connections, including fuse blocks, were evaluated for aging management using the "spaces" approach. The staff noted that technical position paper PP-DRE-QDC Revision 02-AP identified fuse holders and fuse blocks as passive components supporting the intended function of providing electrical connections to specified sections of an electrical circuit to deliver system voltage and current. However, the inspectors found that the applicant's electrical spaces position paper, PP-DRE-QDC-Revision 01-SPACES, was inconsistent with the active/passive position paper in that it identified fuse holders and fuse blocks as active components. During the scoping methodology audit, the applicant stated that the active classification for fuse holders and blocks in the PP-DRE-QDC Revision 01-SPACES was incorrect and would be revised to match the passive classification in PP-DRE-QDC-Revision 02-AP. Despite the discrepancy in procedure PP-DRE-QDC Rev 01-SPACES, the applicant appropriately classified fuse holders and blocks as passive components. The staff concluded that the applicant's scoping and screening methodology addressed the treatment of fuse holders in a manner consistent with the staff's guidance contained in ISG-5.

The staff determined that the applicant's electrical and I&C screening methodology was consistent with the guidance contained in NUREG-1800 and was capable of identifying passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.4 Conclusions

The staff review of the information presented in Section 2.1 of the LRA, the supporting information in the scoping and screening implementation procedures and reports, the information presented during the scoping and screening methodology audit, and the applicant's responses to the staff's RAIs formed the basis of the staff's safety determination. The staff verified that the applicant's scoping and screening methodology, including its supplemental 10 CFR 54.4(a)(2) review which brought additional non-safety-related piping segments and associated components into the scope of license renewal, was consistent with the requirements of the Rule and the staff's position on the treatment of non-safety-related SSCs. On the basis of this review, the staff concluded that, there is reasonable assurance that the applicant's methodology for identifying the SSCs within the scope of license renewal and the SCs requiring an AMR is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

2.1.5 References

1. NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," April 2001

2. NEI 95-10, Revision 3, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54—The License Renewal Rule," August 2001

3. Letter from the NRC to Exelon Generation Company, LLC, "Request For Additional Information for the Review of the Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2, License Renewal Application," July 21, 2003 (ADAMS Accession No. ML0320200800)

4. Letter from Exelon Generation Company, LLC, to the NRC, "Additional Information for the Review of the License Renewal Applications for Quad Cities Nuclear Power Station, Units 1 and 2 and Dresden Nuclear Power Station, Units 2 and 3," RS-03-178, October 3, 2003

5. Desktop Guide, Revision 2, "Scoping & Screening of Systems, Structures and Components"

6. GE-NE-LRTI-2000, Revision 6, "Technical Instruction for Exelon Dresden/Quad Cities License Renewal Project—Scoping and Screening of Systems, Structures and Components for License Renewal"

7. PP-QDC-DRE Revision 00 IN, "Treatment of Pipe/Equipment Insulation During Scoping and Screening Systems for License Renewal"

8. PP-DRE Revision 03 SBO, "Systems and Structures Relied Upon to Demonstrate Compliance with 10 CFR 50.63 (Station Blackout) Dresden Station—Units 2 and 3"

9. PP-QDC Revision 03 SBO, "Systems and Structures Relied Upon to Demonstrate Compliance with 10 CFR 50.63 (Station Blackout) Quad Cities Station—Units 1 and 2"

10. PP-DRE-QDC Revision 02-AP, "Active/Passive Classification and Intended Function Determination of Structures and Components"

11. PP-DRE-QDC Revision 01 SPACES, "Scoping and Screening Position Paper for Electrical Components Based on Electrical Spaces Approach for Aging Management Review"

12. LRTI-16, Revision 0, "Identification of Non Safety-related Structures and Components Which Spatially or Structurally Interact With Safety-related Systems"

13. NRC Inspection Report 50-237/03-04(DRS), 50-249/03-04(DRS), 50-254/03-04(DRS), 50-265/03-04(DRS), "Dresden Nuclear Power Station, Quad Cities Nuclear Power Station, NRC License Renewal Scoping/Screening Inspection," September 15, 2003

14. Letter from the NRC to Exelon Generation Company, LLC, "Follow-Up of an Inspection Open Item Related to the Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities

Nuclear Power Station, Units 1 And 2, License Renewal Application," October 20, 2003 (ADAMS Accession No. ML032940056)

15. Letter from Exelon Generation Company, LLC, to the NRC, "Additional Information for the Review of the License Renewal Applications for Dresden Nuclear Power Station, Units 2 and 3 and Quad Cities Nuclear Power Station, Units 1 and 2," RS-03-328, December 22, 2003

16. Letter from Exelon Generation Company, LLC, to the NRC, "Additional Information for the Review of the License Renewal Applications for Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2," RS-03-325, December 17, 2003

17. Letter from Exelon Generation Company, LLC, to the NRC, "Additional Information for the Review of the License Renewal Applications for Dresden Nuclear Power Station, Units 2 and 3 and Quad Cities Nuclear Power Station, Units 1 and 2," RS 04-046, March 25, 2004

18. Letter from Exelon Generation Company, LLC, to the NRC, "Response to License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations," RS 04-057, April 9, 2004

19. Letter from Exelon Generation Company, LLC, to NRC, "Follow-up Response to License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations," RS 04-073, May 18, 2004

2.2 Plant-Level Scoping Results

2.2.1 Summary of Technical Information in the Application

This section addresses the plant-level scoping results for license renewal. Per 10 CFR 54.21(a)(1), the applicant must identify and list SCs subject to an AMR. These are passive and long-lived SCs that are within the scope of license renewal.

In LRA Tables 2.2-1 and 2.2-2, the applicant provided a list of the plant systems and structures, respectively, identifying those that are within the scope of license renewal and those that are not within the scope of license renewal. Systems and structures that exist only at one station are marked in the tables as "Dresden only" or "Quad Cities only," as appropriate. The Rule does not require the identification of all plant systems and structures. However, providing such lists allows for a more efficient staff review. Based on the design-basis events considered in the plant's CLB and other CLB information relating to non-safety-related systems and structures and certain regulated events, the applicant identified those plant-level systems and structures within the scope of license renewal, as defined in 10 CFR 54.4. To verify that the applicant has properly implemented its methodology, the staff focuses its review on the implementation results to confirm that there is no omission of plant-level systems and structures within the scope of license renewal.

The staff performed the following two-step evaluation:

(1) The staff determined whether the applicant properly identified the SSCs within the scope of license renewal, in accordance with 10 CFR 54.4. The staff reviewed selected SSCs identified by the applicant as not falling within the scope of license renewal to determine whether they have any intended functions that do fall within the scope of license renewal.

(2) The staff then determined, in accordance with 10 CFR 54.21(a)(1), whether the applicant properly identified the SCs that are subject to an AMR from among the SSCs that were identified as being within the scope of license renewal in accordance with 10 CFR 54.4. The staff reviewed selected SCs that the applicant identified as being within the scope of license renewal to verify whether they perform their intended functions, as described in 10 CFR 54.4, without moving parts or without a change in configuration or properties and are not subject to replacement based on qualified life or specified time period.

In LRA Section 2.3, "Scoping and Screening Results: Mechanical Systems," Section 2.4, "Scoping and Screening Results: Structures," and Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Controls Systems," the applicant describes the SSCs that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively. The staff evaluated components and commodities associated with all systems and structures within LRA Sections 2.3 through 2.5. In LRA Sections 2.3.1 ("Reactor Coolant System"), 2.3.2 ("Engineered Safety Features Systems"), 2.3.3 ("Auxiliary Systems"), and 2.3.4 ("Steam and Power Conversion Systems"), the applicant described the mechanical systems and components within the scope of LR and subject to an AMR based on the applicant's license renewal scoping and screening methodology as described in Section 2.1 of this SER.

Structures that support or provide shelter and protection for the operation of other systems are presented in LRA Section 2.4. Some structural components were treated as bulk commodity items common to various systems and structures. These commodity items are described in LRA Section 2.4.15, "Component Supports Commodity Group," and LRA Section 2.4.16, "Insulation Commodity Group."

Electrical systems and I&C systems that support the operation of both safety and non-safety-related systems are presented in LRA Section 2.5. Electrical and I&C components are all treated using a bulk commodity approach.

2.2.2 Staff Evaluation

In LRA Section 2.1, the applicant describes its methodology for identifying the SCs that are within the scope of license renewal and subject to an AMR. This methodology typically consists of a review of all plant SSCs to identify those that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4. From those SSCs that are within the scope of license renewal, an applicant will identify and list those SCs that are passive (i.e., that perform their intended function(s) without moving parts, or without a change in configuration or properties) and are long-lived (i.e., that are not replaced based on a qualified life or specified time period). The staff reviewed the scoping and screening methodology and provided its evaluation in Section 2.1 of this SER. The applicant documented the implementation of the methodology in LRA Sections 2.3 through 2.5. The staff's review of the applicant's implementation was conducted in accordance with Section 2.3 of the SRP-LR and is described in Sections 2.3 through 2.5 of this SER.

To ensure that the scoping and screening methodology described in LRA Section 2.1 was properly implemented, and that the SCs that are subject to an AMR were properly identified, the staff performed an additional review. The staff sampled the contents of the UFSAR based on the listing of systems and structures in LRA Tables 2.2-1 and 2.2-2 to determine whether there were systems or structures that may have intended functions as defined by 10 CFR 54.4 but were not included within the scope of license renewal. The staff did not identify any omissions.

In LRA Section 1.4, the applicant stated that Dresden Unit 1 has been placed in a safe storage condition until Units 2 and 3 are ready for decommissioning. Although Dresden Unit 1 has been left intact, the fuel has been removed from the reactor vessel, and radioactive liquids have been drained from the systems and components and have been processed. However, the diesel-driven fire pump and the crib house in Dresden Unit 1 provide support for operation of Units 2 and 3 that satisfy the criteria of 10 CFR 54.4(a). The staff's evaluation of this Unit 1 diesel-driven fire pump and the crib house SCs is provided in Section 2.3.3.5 of this SER.

In the Dresden and Quad Cities LRA, Sections 2.3 through 2.5, the applicant identified and listed the SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). The applicant identified the mechanical systems components and structural components that are subject to an AMR in LRA Sections 2.3 and Section 2.4, respectively. The staff documents the findings from its review and evaluation of the applicant's mechanical systems and plant structural components screening results in Sections 2.3 and 2.4 of this SER, respectively.

2.2.3 Conclusions

The staff reviewed LRA Section 2.2 and the supporting information in the Dresden and Quad Cities UFSARs to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. As a result of this review, the staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the SSCs that are within the scope of license renewal in accordance with 10 CFR 54.4. The NRC staff's detailed review of the SSCs that are subject to an AMR is provided in Sections 2.3 through 2.5 of this SER.

2.3 Scoping and Screening Results: Mechanical Systems

This section addresses the scoping and screening results of the following mechanical systems for the license renewal.

Reactor Systems

- reactor vessel
- reactor internals
- reactor coolant system
- reactor recirculation system
- reactor vessel head vent system
- nuclear boiler instrumentation system

- head spray system
- RC pressure boundary components in other systems

Engineered Safety Feature Systems

- high-pressure coolant injection system
- core spray system
- containment isolation components and primary containment piping system
- reactor core isolation cooling system (Quad Cities only)
- isolation condenser (Dresden Only)
- residual heat removal system (Quad Cities only)
- low-pressure coolant injection system (Dresden only)
- standby liquid control system
- standby gas treatment system
- automatic depressurization system
- anticipated transient without scram system

Auxiliary Systems

- refueling equipment
- shutdown cooling system (Dresden only)
- control rod drive hydraulic system
- reactor water cleanup system
- fire protection system
- emergency diesel generator and auxiliaries
- HVAC—main control room
- HVAC—reactor building
- ECCS corner room HVAC
- station blackout building HVAC
- station blackout system (diesel and auxiliaries)
- diesel generator cooling water system
- diesel fuel oil system
- process sampling system
- carbon dioxide system
- service water system
- reactor building closed cooling water system
- turbine building closed cooling water system
- demineralizer water makeup system
- residual heat removal service water system (Quad Cities only)
- containment cooling service water (Dresden only)
- ultimate heat sink
- fuel pool cooling system and filter demineralizer system
- plant heating system
- containment atmosphere monitoring system
- nitrogen containment atmosphere dilution system
- drywell nitrogen inerting system
- safe shutdown makeup pump system (Quad Cities only)

Steam and Power Conversion Systems

- main steam system
- feedwater
- condensate and condensate storage system
- main condenser
- main turbine and auxiliaries
- turbine oil system (Quad Cities only)
- main generator and auxiliaries (Quad Cities only)

As a result of the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the applicant added the following non-safety-related systems previously excluded from the scope of license renewal to the scope for the first time at one or both sites.

- circulating water
- laundry treatment system (Dresden only)
- zinc injection system
- extraction steam system (Quad Cities only)
- feedwater heater drains and vents (Quad Cities only)

According to 10 CFR 54.21(a)(1), an applicant must identify and list SCs subject to an AMR. These are passive, long-lived SCs that are within the scope of license renewal. To verify that the applicant has properly implemented its methodology, the staff focuses its review on the implementation results. Such a focus allows the staff to confirm that there is no omission of mechanical system components that are subject to an AMR. If the review identifies no omission, the staff has the basis to find that there is reasonable assurance that the applicant has identified the mechanical system components that are subject to an AMR.

2.3.1 Reactor Vessel, Internals, and Reactor Coolant System

2.3.1.1 Reactor Vessel

2.3.1.1.1 Summary of Technical Information in the Application

The applicant described the reactor vessel in License Renewal Application (LRA) Section 2.3.1.1 and provided a list of components subject to an aging management review (AMR) in LRA Table 2.3.1-1.

The reactor vessel contains the reactor core, the reactor internals, and the reactor core coolant-moderator. It serves as a high-intensity barrier against leakage of radioactive materials to the drywell.

The reactor vessel is a vertical, cylindrical pressure vessel with hemispherical heads. The cylindrical shell and bottom hemispherical head of the reactor vessel are of welded construction and are fabricated of low alloy steel plate. The removable top head is attached to the cylindrical shell flange by bolting. The major safety function for the reactor vessel is to provide a radioactive material barrier. The vessel also provides a floodable core volume, contains the moderator, and provides support for the reactor vessel internals.

Intended Functions within the Scope of License Renewal include the following:

Pressure Boundary—Maintains the integrity of the reactor coolant pressure boundary

Containment—Provides a fission product containment barrier

Physical Support—Provides vertical and horizontal support for the core and other reactor vessel internals

Core Cooling—The reactor vessel and the reactor vessel internals provide a means to distribute coolant to the fuel assemblies located in the core and provides a floodable volume to at least two-thirds core height following design basis accidents

Table 2.3.1-1 of the LRA identified the component groups requiring AMR. The component groups which were identified for the reactor vessel include:

- Closure Bolting
- Nozzle Safe Ends
- Nozzles
- Penetrations
- Bottom Head Drain
  - Control Rod Drive Stub Tubes
  - Incore Instrument Housings
  - Instrumentation and Jet Pump Instrumentation
  - Standby Liquid Control
- Penetrations (Control Rod Drive Stub Tubes)
- Support Skirts and Attachment Welds
- Top Head Enclosure (Closure Studs and Nuts)
- Top Head Enclosure (Head Flanges)
- Top Head Enclosure (Top Heads and Nozzles)
- Vessel Bottom Heads
- Vessel Shell Attachment Welds
- Vessel Shells
  - Beltline Welds
  - Flange
  - Intermediate Beltline Shell
  - Intermediate Nozzle Shell
  - Lower Shell
  - Upper Shell

2.3.1.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.1, Dresden UFSAR Section 5.3, and Quad Cities UFSAR Section 5.3 to determine whether there is reasonable assurance that the reactor vessel components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP-LR and is described as below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components (SSCs) within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the structures and components that were identified as not being within the scope of license renewal to verify the following:

- these structures and components do not have any of the intended functions delineated under 10 CFR 54.4(a)

- for those structures and components that have applicable intended function(s), verify that they either perform these function(s) with moving parts or a change in configuration or properties, or they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any function(s) delineated under 10 CFR 54.4(a) that were not identified as intended function(s) in the LRA, to verify that the SSCs with such function(s) will be adequately managed so that the function(s) will be maintained consistent with the CLB for the extended period of operation.

After completing the initial review, the staff requested the applicant to provide additional information on the reactor vessel. By letter dated October 3, 2003 (Ref. 1), the applicant responded to the staff's request for additional information (RAI) as discussed below.

In RAI 2.3.1.1-1, the staff requested the applicant to verify whether the plant is equipped with a thermal shield, whose intended function is to provide shielding for the safety-related SSCs, such as the reactor vessel and the internals, from gamma and neutron radiation, and thereby, it may be relied upon to minimize irradiation induced embrittlement of the vessel and/or the internals. If the component exists at Quad Cities and/or Dresden, the staff requested the applicant to justify its exclusion from aging management; otherwise, to submit an AMR for the subject component. In response, the applicant stated that the reactor vessels at Dresden and Quad Cities do not contain any thermal shield to protect safety-related SSCs such as the reactor vessel and the vessel internals from radiation. Further, no boiling water reactors manufactured by General Electric contain such a design feature. Therefore, there is no need to identify such a component in the LRA. Based on the above discussion, the staff finds the applicant's assessment acceptable.

In RAI 2.3.1.1-2, the staff requested the applicant to clarify whether the vessel head spray nozzle is included in LRA Table 2.3.1-1 as part of the component group "Nozzles." If the component was not included in LRA Table 2.3.1-1, the staff requested the applicant to justify its exclusion from aging management; otherwise, to submit an AMR for the subject component. In response, the applicant stated that the vessel head spray nozzles for Dresden are included in LRA Table 2.3.1-1 as part of the component group "Top Head Enclosure (Top Head Nozzles)" and are subject to aging management. Based on the above discussion, the staff finds the applicant's assessment acceptable.

In RAI 2.3.1.1-3, the staff requested the applicant to indicate whether (1) thermal sleeves for core spray and recirculation inlet nozzles, (2) standby liquid control and core differential pressure line, and (3) low-pressure coolant injection (LPCI) coupling are considered part of the reactor pressure vessel nozzles, safe ends, attachments and instrument penetrations requiring an AMR. If so, the staff requested the applicant to provide an AMR for the subject components and include them in LRA Table 2.3.1-1. Also, the staff requested that the applicant indicate whether the nozzles connecting the reactor recirculation system to the connecting piping should be identified as reactor recirculation system components requiring AMR. In response, the applicant stated the follwoing:

- The thermal sleeves for core spray are considered to be part of the core spray lines and spargers. They are addressed in LRA Section 2.3.1.2.1, Table 2.3.1-2, Component Group, – Core Spray Lines and Spargers. The recirculation inlet nozzles thermal sleeves are considered an integral part of the recirculation nozzles. They are addressed in LRA Section 2.3.1.1, Table 2.3.1-2, Component Group - Nozzle Safe Ends.

- LRA Section 2.3.2.8 Standby Liquid Control, Table 2.3.2-8, Component Group - Piping and Fittings, addresses the standby liquid control line (not including the vessel nozzle).

- LRA Section 2.3.1.1 Reactor Vessel, Table 2.3.1-1, Component Group - Nozzle Safe Ends, addresses the standby liquid control nozzle.

- LRA Section 2.3.1.3.3 Nuclear Boiler Instrumentation, Table 2.3.1-7, Component Group - Piping and Fittings (small bore) addresses the core differential pressure line. These system evaluation breaks are depicted on Boundary Diagrams LR-DRE-M-26-1 (E/6), LR-DRE-M-357-1 (B/5), LR-QDC-M-35-1 (G/4), and LR-QDC-M-77-1 (G/4).

  Those portions of the standby liquid control and core differential pressure piping located inside the reactor vessel were determined to be not in the scope of the Rule. They do not perform a safety-related function and their failure would not prevent a safety-related SSC from performing a safety-related function. This evaluation is supported by BWRVIP-27, BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines. BWRVIP-27 has been evaluated and accepted by the NRC staff. Paragraph 2.2.1 of BWRVIP-27 provides a safety assessment stating that the standby liquid control and core differential pressure internals are not essential and therefore concluded in paragraph 3.1.1 of BWRVIP-27 that no inspections are recommended.

- As stated in LRA Table 3.1-1, Ref. No. 3.1.1.17 low-pressure coolant injection (LPCI) couplings are not used at Dresden or Quad Cities. The low-pressure coolant injection (LPCI) coupling identified in BWRVIP-06, Safety Assessment of BWR Reactor Internals, applies to BWR/4, BWR/5 and BWR/6 reactors (Ref. Section 2.7, BWRVIP-06). The Dresden and Quad Cities reactors are a BWR/3 design. Neither site has a LPCI coupling as described in BWRVIP-06.

- LRA Section 2.3.1.1 Reactor Vessel, Table 2.3.1-1, Component Group – Nozzle Safe Ends, includes the nozzles connecting the reactor recirculation system to the connecting piping. They are considered to be part of the reactor vessel and should not be identified as reactor recirculation system components.

Based on the above discussion, the staff finds the applicant's assessment acceptable. There is no need to identify those portions of the standby liquid control and core differential pressure piping located inside the reactor vessel in LRA Table 2.3.1-1. As stated in LRA Table 3.1-1, Reference 3.1.1.17, LPCI couplings are not used at Dresden or Quad Cities, and therefore, there is no need to identify the LPCI couplings in LRA Table 2.3.1-1.

The staff did not identify any omissions.

2.3.1.1.3 Conclusions

The staff reviewed the LRA and the accompanying scoping boundary drawings to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes there is reasonable assurance that the applicant has adequately identified the reactor vessel components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor vessel components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.1.2 Reactor Vessel Internals

2.3.1.2.1 Summary of Technical Information in the Application

The applicant describes the reactor vessel internals in LRA Section 2.3.1.2 and provides a list of components subject to an AMR in LRA Table 2.3.1-2.

The reactor internals are installed to properly distribute the flow of coolant delivered to the vessel, to locate and support the fuel assemblies and control blades, and to provide an inner volume containing the core that can be flooded following a break in the nuclear system process barrier external to the reactor vessel.

The shroud is a stainless steel cylinder which surrounds the reactor core and provides a barrier to separate the upward flow of the coolant through the reactor core from the downward recirculation flow. Bolted on top of the shroud is the steam separator assembly which forms the top of the core discharge plenum. This provides a mixing chamber before the steam-water mixture enters the steam separator. The recirculation outlet and inlet plenum are separated by the baffle plate (part of the shroud support structure) joining the bottom of the shroud to the vessel wall. The jet pump diffuser sits on and is welded to the baffle plate, making the jet pump diffuser section an integral part of the baffle plate. The baffle plate supports all of the vertical weight of the shroud, steam separator and dryer assembly, top guide and bottom core plate (core grids), peripheral fuel assemblies, and jet pump components carried on the shroud. The control rod guide tubes extend up from the control rod drive housing through holes in the core plate. Each tube is designed as a lateral guide for the control rod and as the vertical support for the fuel support piece which holds the four assemblies surrounding the control rod.

Intended Functions within the Scope of License Renewal:

<u>Reactivity Control</u> - The control rod drive mechanisms insert negative reactivity for normal shutdown and for mitigation of operational transients and accidents. Reactor vessel internals,

not directly involved with reactivity insertion, support reactivity insertion by maintaining appropriate geometry to permit proper functioning of the control rod drive mechanism. Standby liquid control system flow supports an alternate method for reactivity control.

Core Cooling - Distributes emergency cooling system flow to the core and maintains coolable core geometry.

Support Safety-Related Function(s) - Reactor vessel internals which do not perform a safety-related function are required not to fail in a way that would cause a safety-related function to fail.

Physical Support - Provides vertical and horizontal support for the core and other reactor vessel internals.

Table 2.3.1-2 of the LRA identified the component groups requiring AMR. The component groups which were identified for the reactor internals include:

- Access Hole Covers (Mechanical)
- Access Hole Covers (Welded) (Dresden only)
- Control Rod Drive Housings [Pressure Boundary]
- Control Rod Drive Housings [Structural Support]
- Control Rod Guide Tubes
- Core Plates
- Core Plates and Bolts
- Core Shrouds (Upper, Central, Lower)
- Core Spray Lines and Spargers [pressure boundary]
- Core Spray Lines and Spargers [Spray]
- Core Spray Lines and Spargers [Structural Support]
- Incore Instrumentation Dry Tubes and Guide Tubes
- Jet Pump Assemblies (Does not include Sensing Lines) [pressure boundary]
- Jet pump Assemblies (Does not include Sensing Lines) [structural support]
- Orificed Fuel Support Pieces
- Orificed Fuel Supports
- Reactor Internals Modification/Repair Hardware
  - Core Spray Clamp
  - Jet Pump Riser Clamp (Quad Cities only)
  - Jet Pump Riser Brace Clamp (Quad Cities only)
  - Shroud Repair
- Shroud Support Structures
- Top Guides

2.3.1.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.2, Dresden UFSAR Section 3.9.5, and Quad Cities UFSAR Section 3.9.5 to determine whether there is reasonable assurance that the reactor vessel internals components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described as below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel internals and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the structures and components that were identified as not being within the scope of license renewal to verify that:

1. these structures and components do not have any of the intended functions delineated under 10 CFR 54.4(a), and

2. for those structures and components that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any function(s) delineated under 10 CFR 54.4(a) that were not identified as intended function(s) in the LRA, to verify that the SSCs with such function(s) will be adequately managed so that the function(s) will be maintained consistent with the CLB for the extended period of operation.

After completing the initial review, the staff requested the applicant to provide additional information on reactor internals. By letter dated October 3, 2003 (Ref. 1), the applicant responded to the staff's request for additional information (RAI) as discussed below:

In Drawing LR-QDC-FSAR-3.9 of the LRA, the steam separator and standpipe assembly are both in scope at Quad Cities. In RAI 2.3.1.2-1, the staff requested the applicant to explain why, per LR-DRE-FSAR-3.9, the steam separator assembly, including the steam separator, steam separator standpipe and steam plenum head, are not also in scope at Dresden. In response, the applicant stated that LR-QDC-FSAR-3.9 incorrectly shows the steam separator and standpipe assembly as in scope at Quad Cities. The steam separator and standpipe assemblies are not safety-related, nor would their failure cause another safety-related SSC from performing its safety-related function, as discussed in BWRVIP-06, BWR Vessel and Internals Project, Section 3.2.2. Therefore, the steam separator and standpipe assemblies at both Dresden and Quad Cities are not in the scope of the rule and not subject to AMR. The steam plenum head depicted on LR-DRE-FSAR-3.9 is the area between the core shroud head and the bottom of the steam separator standpipe. It is not a component. Based on the above discussion, the staff finds the applicant's assessment acceptable.

In drawing LR-DRE-FSAR-3.9, steam dryer lifting lugs are in scope at Dresden. In RAI 2.3.1.2-2, the staff requested the applicant to identify if Quad Cities has steam dryer lifting lugs and if so, to explain why the steam dryer lifting lugs are in scope at Dresden but not Quad Cities. In response, the applicant stated the steam dryer lifting lugs are not identified on LR-DRE-FSAR-3.9, however, these lugs are out of scope at both Dresden and Quad Cities. This is consistent with boundary diagram LR-QDC-FSAR-3.9 which does show the steam dryer lifting lugs as out of scope. Based on the above discussion, the staff finds the applicant's assessment acceptable.

As noted in NRC Information Notice 2002-26, "Failure of Steam Dryer Cover Plate After a Recent Power Uprate," dated September 11, 2002, Quad Cities Unit 2 experienced a failure of the steam dryer cover plate in March 2002 following implementation of the 17.8% power uprate of the unit. One piece of the dryer cover plate had fallen onto the separator; another piece was found in the dryer; a third piece had lodged in the A main steam line flow venturi (upstream of the main steam isolation valves); and several other pieces had been swept down the A main steam line downstream of the MSIVs into a turbine stop valve strainer. It was reported by the applicant however, that there was no apparent damage other than minor scratches and gouges to the main steam nozzle and piping.

On June 12, 2003, inspections of the steam dryer at Quad Cities Unit 2 identified the following: (1) through-wall cracking (about 90 inches in length) in the vertical and horizontal outer hood plate, (2) one vertical and two diagonal internal braces detached on the outer hood, (3) one severed vertical internal brace on the outer hood, and (4) three cracked tie bars on top of the dryer.

Following up on this recent issue, the staff issued RAI 4.3.0. In RAI 4.3.0(a), the staff is concerned that while components such as the steam dryer and steam separator are non-safety-related, the failure of these components (as experienced at Quad Cities Unit 2) could potentially impact other safety-related components. This issue was also discussed during the Advisory Committee on Reactor Safeguards (ACRS) subcommittee meeting on April 14, 2004, and then during the full committee meeting on September 9, 2004. In a letter dated September 16, 2004, the ACRS recommended that for Dresden Units 2 and 3 and Quad Cities Units 1 and 2, the steam dryers should be included in the scope of license renewal. By letter dated October 8, 2004, Exelon has committed to include the steam dryers within the scope of license renewal for Dresden and Quad Cities for 10 CFR 54.4(a)(2). The aging effect that needs to be managed is cracking. The aging management program will be the NRC approved Boiling Water Reactor Vessel Internals Program (BWRVIP) Steam Dryer Inspection and Evaluation Guideline. If the BWRVIP Steam Dryer Inspection and Evaluation Guideline is not approved by the NRC then a plant specific aging management program will be submitted to the NRC for review and approval by December 22, 2007, which is two years before the first Dresden unit enters the period of extended operation. This is part of Commitment #9 in Appendix A of this SER.

Also in response, the applicant stated additional information regarding the steam dryer failure was provided to the NRC in report GENE-0000-0018-3359-P, "Technical Assessment, Quad Cities Unit 2 Steam Dryer Failure - Determination of Root Cause and Extent of Condition," Revision 1, dated August 2003, which was transmitted by letter from Mr. P.R. Simpson (Exelon Generation Company) to the NRC, "Transmittal of General Electric Technical Assessment Regarding Quad Cities Nuclear Power Station Unit 2 Steam Dryer Failure," dated August 11, 2003. The failure of the steam dryer as described in the above technical assessment was attributed to high cycle fatigue resulting from low frequency pressure loading on the outer hoods during normal operation. The failure did not prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i), (ii) or (iii). Those portions of non-safety-related SSCs that could spatially or structurally interact with a safety-related SSC in a manner that would prevent the accomplishment of a safety-related SSC intended function were included within the scope of License Renewal as described in LRA Section 2.1.2.2 and in response to

RAI 2.1-2: CFR 54.4(a)(2), Scoping Criteria for non-safety-related SSCs. Based on the above discussion and the applicant's commitment, the staff finds the applicant's assessment acceptable.

In RAI 4.3.0(b), the staff requested the applicant to explain how they have considered or examined the potential synergistic effects of large power uprates and plant aging (for those SSCs within scope of license renewal). In response, the applicant stated the Dresden/Quad Cities extended power uprate (EPU) evaluations that explicitly included an assumption of 60 years operation (54 effective full power years [EFPY]) were the Reactor Fracture Toughness Evaluation and the Reactor Internals Flow Induced Vibration Evaluation. The Reactor Fracture Toughness Evaluation determined that there is an increase in the ART (adjusted reference temperature) of the limiting beltline material, and a corresponding increase in the beltline portion of the pressure-temperature (P-T) curves is required to include the increase in fluence and licensed EFPY for the P-T curves for 54 EFPY. Exelon will submit revised Dresden P-T curves to the NRC for 54 EFPY. The Reactor Internals Flow Induced Vibration Evaluation concluded that, except for the Dresden Unit 2 jet pump riser braces, the Dresden and Quad Cities units can operate at the increased flow associated with EPU conditions for a 60-year plant life without exciting the safety-related reactor internal components above their established vibration criteria limits during balanced (dual loop) recirculation flow operation and without developing resonance problems due to vane passing frequency excitation. Additionally, the EPU analyses considered single recirculation loop operation and concluded that with the existing flow restrictions that apply for single recirculation loop operation, there is no resonance problem due to vane passing frequency excitation at EPU conditions. The exception involving the Dresden Unit 2 jet pump riser braces occurs because these riser braces are designed differently from the Dresden Unit 3 and the Quad Cities Units 1 and 2 jet pump riser braces. LRA Section 4.3.2.2 includes a commitment to repair or replace the Dresden Unit 2 jet pump riser braces prior to the period of extended operation. The Dresden/Quad Cities license renewal evaluations were based upon the plant environmental conditions associated with EPU implementation. Prior to the period of extended operation, the Environmental Qualification (EQ) Binders for components within the scope of 10 CFR 50.49 will be updated to include environmental conditions associated with EPU implementation together with an extended operating period of 60 years. No other synergistic effects of large power uprates and plant aging were considered for those SSCs within the scope of license renewal. Based on this discussion, the staff finds the applicant's assessment acceptable.

In RAI 2.3.1.2-3, the staff requested the applicant to explain why feedwater spargers are not in scope. In response, the applicant stated the feedwater spargers are not in scope because their failure would not prevent the injection of coolant makeup and they are not required to safely shutdown the reactor. They were therefore classified as non-safety-related. Also, the sparging function is not credited in delivery of Emergency Core Cooling System (EECS) flow to the vessel and no failure that could result in consequential failure of safety-related components has been identified. Therefore, there is no need to identify such a component in the LRA. Based on the above discussion, the staff finds the applicant's assessment acceptable.

In accordance with 10 CFR 54.4(a) criteria, sump screens and vortex suppressors/breakers are in scope of license renewal requiring AMR. In RAI 2.3.1.2-4, the staff requests the applicant to identify if sump screens and vortex suppressors/breakers are in scope at Dresden and Quad Cities. If they are in scope, the applicant was asked to submit the AMR results to the staff. If they are not within scope, the applicant was asked to explain the reason for their exclusion. In response, the applicant stated that Sump (ECCS) screens and vortex suppressors/breakers are installed in pressurized-water reactors (PWR). The equivalent boiling-water reactor equipment is the suppression chamber ECCS suction strainers. At Dresden and Quad Cities, these ECCS suction strainers are in the scope of license renewal and are managed for aging. The suppression chamber ECCS suction strainers are included in LRA Section 2.3.2.7, Table 2.3.2-7 under the Component Group "filters/strainers (Dresden only)" with "filter" as the component intended function, and in LRA Section 2.3.2.6, Table 2.3.2-6, under the Component Group "Filters/Strainers (Quad Cities only)" with "Filter" as the component intended function. The aging management results of the strainer (stainless steel) components that are exposed to 25 - 288 ^{0}C demineralized water environment are provided in Aging Management Reference 3.2.1.13, LRA Table 3.2-1. The aging mechanism of blockage, as it applies to strainers, is managed by the "Protective Coating Monitoring and Maintenance" aging management program, B.1.32, which provides for aging management of service level I coatings inside the primary containment. Based on the above discussion, the staff finds the applicant's assessment acceptable.

The applicant has identified most of the reactor internals requiring AMR. However, there are a few items that normally would be considered part of reactor pressure vessel internals requiring AMR that have not been included in the submitted LRA. In RAI 2.3.1.2-5, the staff requested the applicant to justify the following exclusions from aging management; otherwise, submit an AMR for the subject component:

- Thermal sleeves for core spray and recirculation inlet nozzles. These sleeves represent pressure boundary and direct flow to core spray spargers and jet pumps, respectively

- Standby liquid control and core differential pressure line (SLC/core delta P line, pressure boundary PB)

- Please identify all the components that are included in Component Group "Jet pump assemblies," and also explaining why sensing lines are not included in jet pump assemblies

- Low pressure coolant injection coupling

In response to RAI 2.3.1.2-5, the applicant provides the following clarification of either where to find the components in the LRA or the justification for excluding the component from AMR.

- The thermal sleeves for core spray are considered to be part of the core spray lines and spargers. They are addressed in LRA Section 2.3.1.2.1, Table 2.3.1-2, Component Group - Core Spray Lines and Spargers. The recirculation inlet nozzle thermal sleeves are considered an integral part of the recirculation nozzles. They are addressed in LRA 2.3.1.1, Table 2.3.1-2, Component Group - Nozzle Safe Ends.

- The portions of the standby liquid control and core differential pressure piping located inside the reactor vessel were determined to be not in the scope of license renewal. They do not perform a safety-related function and their failure would not prevent a safety-related SSC from performing a safety-related function. This evaluation is supported by BWRVIP-27, BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines. BWRVIP-27 has been evaluated and accepted by the NRC staff. Paragraph 2.2.1 of BWRVIP-27 provides a safety assessment stating that the standby liquid control and core differential pressure internals are not essential, and therefore concluded in paragraph 3.1.1 of BWRVIP-27 that no inspections are recommended.

- The Jet Pump Assemblies group is comprised of the following components:
  - a. Thermal Sleeve
  - b. Inlet Header
  - c. Riser Brace Arm
  - d. Hold Down Beams
  - e. Inlet Elbow
  - f. Mixing Assembly
  - g. Diffuser

  BWRVIP-41, BWR Jet Assembly Inspection and Flaw Evaluation Guidelines (Section 2.3.12.7) concludes that inspection of sensing lines is essentially occurring continuously by plant operations. If a sensing line were to fail, the ability to monitor jet pump integrity would be lost. Plant Technical Specifications would require either a plant shutdown or safety assessment to justify continued operation if a failure were to occur. Therefore, sensing line failure has no adverse safety consequences and no inspection is required.

- As stated in LRA Table 3.1-1, Ref No. 3.1.1.17 LPCI couplings are not used at Dresden or Quad Cities. The LPCI coupling identified in BWRVIP-06, Safety Assessment of BWR Reactor Internals, applies to BWR/4, BWR/5, and BWR/6 reactors (see Section 2.7 of BWRVIP-06). The Dresden and Quad Cities reactors are a BWR/3 design. Neither site has a LPCI coupling as described in BWRVIP-06.

Based on the above discussion, the staff finds the applicant's assessment acceptable. The staff did not identify any omissions.

2.3.1.2.3 Conclusions

The staff reviewed the LRA and the accompanying scoping boundary drawings to determine whether any systems, structures, or components that should be within the scope of license renewal were not identified by the applicant. The staff did not identify any omissions. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor vessel internals components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor vessel internals components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.1.3 Reactor Coolant System

2.3.1.3.1 Summary of Technical Information in the Application

The applicant described the reactor coolant system in LRA Section 2.3.1.3 and provided a list of components subject to an AMR in LRA Tables 2.3.1-5 through 2.3.1-9.

The reactor coolant system for BWRs as described in NUREG-1800 includes the reactor coolant recirculation system and portions of other systems connected to the pressure vessel extending to the first isolation valve outside of containment or to the first anchor point. For Dresden and Quad Cities, the reactor coolant system comprises the following plant systems:

- Reactor recirculation system, recirculation flow control, and M/G sets
- Reactor vessel head vent system
- Nuclear boiler instrumentation system
- Head spray system (Dresden only)
- Reactor coolant pressure boundary components in other systems
  - High-pressure coolant injection system
  - Core spray system
  - Reactor core isolation cooling system (Quad Cities only)
  - Isolation condenser (Dresden only)
  - Residual heat removal system (Quad Cities only)
  - Low-pressure coolant injection system (Dresden only)
  - Standby liquid control system
  - Shutdown cooling system (Dresden only)
  - Control rod drive hydraulic system
  - Reactor water cleanup system
  - Main steam system
  - Feedwater system

In RAI 2.1-2, the staff stated that by letters dated December 3, 2001, and March 15, 2002, the NRC issued a staff position to the Nuclear Energy Institute (NEI) which described areas to be considered and options it expects licensees to use to determine what SSCs meet the 10 CFR 54.4(a)(2) criterion (i.e., all non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any safety-related functions identified in paragraphs (a)(1)(i),(ii),(iii) of this section.)

The December 3rd letter provided specific examples of operating experience which identified pipe failure events (summarized in Information Notice 2001-09, "Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor") and the approaches that the NRC considers acceptable to determine which piping systems should be included in the scope based on 10 CFR 54.4(a)(2).

The March 15th letter further described the staff's expectations for the evaluation of non-piping SSCs to determine which additional non-safety-related SSCs are within scope. The position states that applicants should not consider hypothetical failures, but rather should base their evaluation on the plant's current licensing basis (CLB), engineering judgement and analyses, and relevant operating experience. The letter further describes operating experience as all documented plant-specific and industry-wide experience which can be used to determine the plausibility of a failure. Operating experience documentation sources would include NRC generic communications and event reports, plant-specific condition reports, industry reports such as SOERs, and engineering evaluations.

Based on a review of the LRA, the applicant's scoping and screening implementation procedures, and discussions with the applicant, the staff determined that additional information is required with respect to certain aspects of the applicant's evaluation of the 10 CFR 54.4(a)(2) criteria. The staff asked the applicant to address the following issues:

- LRA Section 2.1.2.2, "Title 10 CFR 54.4(a)(2) - Non-safety-related affecting safety-related," stated that the applicant performed plant walkdowns to identify those areas containing safety-related SSCs. The applicant further stated in LRA Section 2.1.2.2 that, in those instances where a plant walkdown could not be performed, it used plant drawings to identify those areas containing safety-related SSCs and identify component interactions. For areas where walkdowns could not be performed to identify non-safety-related SSCs that could affect safety-related SSCs, the staff asked the applicant to describe the methodology and documentation sources used to perform scoping pursuant to 10 CFR 54.4(a)(2). In its response, the NRC asked the applicant to list the areas where walkdowns were not performed and the basis for not performing the walkdowns.

- Instruction LRTI-16, "Identification of Non Safety-related Structures and Components Which Spatially or Structurally Interact With Safety-related Systems," describes the process used to identify non-safety-related systems and components which meet the scoping criteria specified in 10 CFR 54.4(a)(2) due to spatial or structural interaction with safety-related systems. Section 4.3 of LRTI-16 states that non-safety-related systems are evaluated using the criteria provided in LRTI-16, Table 2, "Spatial Interaction Screening Criteria." The staff asked the applicant to describe the basis and/or justification for the use of the following spatial interaction screening criteria contained in LRTI-16, Table 2:

  - Cables in conduit or trays are not affected by water sprays as long as the spray does not target a cable termination area. Nor is it credible that water would be channeled to a termination area (LRTI-16, Table 2, Item 4).

  - Pipe whip and jet impingement only apply to high energy systems containing fluids with temperatures greater than or equal to 200 °F and a pressure greater than or equal to 275 psig (LRTI-16, Table 2, Item 5). The staff noted that this definition of high energy systems appeared to be inconsistent with the current licensing basis definition of a high energy system (for example, see Dresden UFSAR, Section 3.6.1.1.1.1).

  - Fluid sprays can only affect active components (LRTI-16, Table 2, Item 6).

  - Early detection of leaks (sumps and floor drain systems) is taken credit in the scope of the rule to prevent long term degradation of passive equipment and flooding beyond the lowest elevation of the building (LRTI-16, Table 2, Item 8).

  - Spray from high energy systems can affect equipment up to 25 feet (LRTI-16, Table 2, Item 10).

  - Spray from medium/low energy systems can affect equipment up to 20 feet (LRTI-16, Table 2, Item 11).

- Section 2.1.2.2 of the LRA states that pipe whip, jet impingement, general flooding, or spray of a gas were not considered credible interactions for gas systems to adversely affect safety-related SSCs. LRTI-16, Table 2, Item 3, states, "while falling equipment from gas systems can spatially impact safety-related components located below them, the only credible manner in which equipment can fall is through failure of the attached supports." Consistent with the staff position described in the March 15th letter, please describe your scoping methodology implemented for the evaluation of the 10 CFR 54.4(a)(2) criteria as it relates to the non-fluid-filled SSCs of interest. As part of your response please indicate the non-fluid-filled SSCs evaluated and describe the site and industry operating experience relied on to determine the potential for failures of such non-fluid-filled SSCs which could impact safety-related SSCs within scope.

- As described in the letter dated March 15, 2003, if an applicant uses a mitigative option when performing the scoping of non-safety-related SSCs under 10 CFR 54.4(a)(2), the applicant should demonstrate that plant mitigative features are adequate to protect safety-related SSCs from non-safety-related SSC failures, regardless of failure location. If an applicant cannot demonstrate that the mitigative features are adequate to protect safety-related SSCs from the consequences of non-safety-related SSC failures, then the entire non-safety-related SSC is required to be brought into scope of license renewal. In reviewing the LRA, the NRC staff was unable to determine if the 10 CFR 54.4(a)(2) scoping methodology considered failures at all piping locations where age-related degradation is possible. Please clarify how the scoping methodology of non-safety-related piping was performed relative to the guidance contained in the staff's March 15, 2003 letter.

- In discussions with the Exelon license renewal project team, the NRC staff noted some cases where non-safety-related plant equipment was credited with providing anchorage for non-safety-related piping that was attached to safety-related piping. In these cases, the non-safety-related piping was placed within the scope of license renewal, but the plant equipment (such as a heat exchanger) was not considered to be within scope. For cases where an entire pipe run including both safety and non-safety-related piping was analyzed as part of the current licensing basis to establish that it could withstand design basis event loads, NUREG-1800, Section 2.1.3.1.2 indicates that the scoping methodology includes: (1) the non-safety-related piping up to its anchors and (2) the associated piping anchors as being within the scope of license renewal under 10 CFR 54.4(a)(2). Because the plant equipment credited with providing support to non-safety-related piping within the scope of license renewal appears to be equivalent to an associated piping anchor as described in NUREG-1800, provide justification for not including this plant equipment within the scope of license renewal.

In addressing each of the above issues, if your review indicates that use of the scoping methodology screened out potential non-safety-related SSCs that could spatially interact with safety-related SSCs, describe any additional scoping evaluations performed to address the 10 CFR 54.4(a)(2) criteria. As part of your response, list any additional SSCs included within scope as a result of your efforts, and list those SCs for which aging management reviews were conducted, and for each SC describe the aging management programs, as applicable, to be credited for managing the identified aging effects.

Based on the applicant's response to RAI 2.1-2 in Reference 2, the staff determined that the applicant did not provide a sufficient basis for limiting consideration of fluid spray interactions to only those non-safety-related SSCs located within 20 feet of an active safety-related SSC. This issue is now identified as Open Item 2.1-1. The staff required additional clarification regarding the capability of active and passive safety-related SSCs located greater than 20 feet from a potential spray source to tolerate wetting, the specific operating experience that was relied upon to determine that it was not credible for fluid sprays to affect equipment greater than 20 feet from a failure location, specific methods to detect leakage in normally accessible and inaccessible areas, and justification for use of exposure duration in limiting the scope of potential failure mechanisms considered during scoping.

In response to Open Item 2.1-1 (Ref. 3), Exelon has revised the methodology utilized in the scoping of non-safety-related moderate energy piping systems that have the potential to spatially interact with safety-related systems. Specifically, Exelon has eliminated the 20 foot separation criterion previously utilized to exclude moderate energy systems from the scope of License Renewal. The revised methodology assumes that all safety-related components, active as well as passive, could be adversely affected by spray or wetting from a non-safety moderate energy system located in the same general area of the plant. As such, early detection of leakage was also eliminated from the revised scoping methodology.

Under the revised scoping methodology, all components from moderate energy non-safety-related systems located in the same general area as a safety-related component (active or passive) will be included within the scope of license renewal. "General area" is defined as the same floor (elevation) of a major building with no barrier walls between the fluid source and the safety-related component. Barrier walls were defined as barriers that form the boundary of a room on the same elevation of a major building separating the safety-related components from a spray or leak generated by a non-safety-related component located on the other side of the barrier wall. All barrier walls credited for protection of safety-related components were previously included within the scope of license renewal during the scoping of structures and are included in the structures monitoring aging management program described in section B.1.30 of the license renewal application and the masonry wall aging management program described in section B.1.29 of the license renewal application.

While both sites contain similar systems and equipment, the location of specific systems and equipment varies between sites. For example, the safety-related standby gas treatment system at Dresden Station is located in the Turbine Building while the same system is located in the Reactor Building at Quad Cities. Because this system resides in two different physical locations at each site, it will spatially interact with different non-safety-related piping systems. This explains why the scoping boundaries for the same non-safety-related system can vary between sites.

Following the revised methodology described above, the boundaries of several non-safety-related systems previously included within scope of license renewal were expanded. Likewise, several non-safety-related systems previously excluded from the scope of license renewal were added to the scope for the first time at one or both sites.

Because of the revised methodology, additional piping and components from the reactor recirculation system were added to the scope of license renewal at Quad Cities due to the potential for spatial interaction with safety-related components. Specifically, the recirculation motor generator oil subsystem was added to the scope of license renewal at Quad Cities. All of the components shown on revised boundary diagrams LR-QDC-M-35-4 and LR-QDC-M-77-4 have been included within the scope of license renewal. The system did not require a boundary expansion at Dresden because the physical plant layout is different than Quad Cities at this location. The resulting changes to LRA Table 2.3.1-5 include the following:

Component	Component Intended Function	LRA Aging Management Reference
Pumps (spatial interaction) (Quad Cities only)	Leakage Boundary (spatial)	3.1.2.66, 3.1.2.67
Tanks (spatial interaction) (Quad Cities only)	Leakage Boundary (spatial)	3.1.2.3, 3.1.2.68

Based on the above discussion, the staff finds the applicant's response and revised methodology changes for the reactor recirculation system acceptable.

Intended Functions within the Scope of License Renewal:

The following intended functions are for the reactor coolant system as a whole as comprised above by the licensee in LRA Sections 2.3.1.3.1 through 2.3.1.3.5.

Pressure Boundary - Maintains integrity for the reactor coolant pressure boundary.

Flow Path - Provides an integral flow path for low pressure core injection (LPCI) flow into the reactor vessel. It also provides a flow path for establishing the shutdown cooling mode of operation.

Support ESF Function(s) - Provides signals and performs actions during a design basis loss of coolant accident for correct selection of the unbroken recirculation loop and closure of the recirculation system valves.

Credited in Regulated Event(s) - Required to enable hot shutdown and cold shutdown during an Appendix R fire event and to provide trips of recirculation pumps to mitigate the ATWS event. The system also contains components that are relied upon for compliance with 10 CFR 50.49 (EQ).

Credited in Regulated Event(s) - Provides trip and initiation signals and process information and indications credited in mitigation of the Appendix R fire, ATWS, and SBO events. The system also contains components that are relied upon for compliance with 10 CFR 50.49, (EQ).

Preclude Adverse Effects on Safety-Related SSCs - Non-safety-related components that could be a hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

Primary Containment Isolation - Provides containment isolation for those portions of the system that interface with the primary containment.

Table 2.3.1-5 of the LRA identified the component groups requiring AMR. The component groups which were identified for reactor recirculation system, recirculation flow control and M/G sets include:

- Closure Bolting (includes flanges)
- Dampeners (Quad Cities only)

- Dampeners (spatial interaction) (Quad Cities only)
- Filters/Strainers (spatial interaction) (Quad Cities only)
- Flow Elements
- NSR Vents or Drains, Piping and Valves (attached support) (Dresden only)
- Piping and Fittings
- Piping and Fittings (spatial interaction)
- Piping and Fittings (attached support)
- Piping and Fittings (small bore)
- Pumps
- Pumps (spatial interaction) (Quad Cities only)[1]
- Restricting Orifices (spatial interaction) (Quad Cities only)
- Sight Glasses (attached support)
- Sight Glasses (spatial interaction) (Quad Cities only)
- Tanks (spatial interaction) Quad Cities only)[1]
- Thermowells
- Tubing
- Tubing (spatial interaction) (Quad Cities only)
- Valves
- Valves (attached support)
- Valves (spatial interaction) (Quad Cities only)

Table 2.3.1-6 of the LRA identified the component groups requiring AMR. The component groups identified for the reactor vessel head vent system include the following:

- closure bolting (includes flanges)
- NSR vents or drains, piping, and valves (attached support)
- piping and fittings
- piping and fittings (small bore)
- sight glasses (attached support, Dresden only)
- tubing
- valves

Table 2.3.1-7 of the LRA identified the component groups requiring AMR. The component groups which were identified for nuclear boiler instrumentation system include:

- Closure Bolting (includes flanges)
- Dampeners (Quad Cities only)
- Filters/Strainers (spatial interaction) (Dresden only)
- NSR Vents or Drains, Piping and Valves (attached support) (Dresden only)
- Pipes
- Piping and Fittings (attached support)
- Piping and Fittings (spatial interaction) (Dresden only)
- Piping and Fittings (Quad Cities only)
- Piping and Fittings (small bore)

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[1]This component has been added to LRA Table 2.3.1-5 because of the applicant's revised methodology in response to Open Item 2.1-1. Additional piping and components from the reactor recirculation system were added to the scope of license renewal at Quad Cities due to the potential for spatial interaction with safety-related components. This component is physically located in another location at Dresden, therefore, it is not in scope of license renewal at the Dresden Station.

- Tanks
- Thermowells
- Tubing
- Tubing (spatial interaction) (Quad Cities only)
- Tubing (attached support) (Quad Cities only)
- Valves
- Valves (spatial interaction)
- Valves (attached support)

Table 2.3.1-8 of the LRA identified the component groups requiring AMR. The component groups which were identified for head spray system (Dresden only) include:

- Closure Bolting (includes flanges) (Dresden only)
- Flow Elements (attached support) (Dresden only)
- NSR Vents or Drains, Piping and Valves (attached support) (Dresden only)
- Piping and Fittings (Dresden only)
- Piping and Fittings (attached support) (Dresden only)
- Piping and Fittings (small bore) (Dresden only)
- Valves (Dresden only)
- Valves (attached support) (Dresden only)

Table 2.3.1-9 of the LRA identified the application sections where the additional reactor coolant pressure boundary components were evaluated. The reactor coolant boundary components evaluated in separate sections of the LRA include:

System Name	Other Application Section That Contain Reactor Coolant Pressure Boundary Components
High Pressure Coolant Injection System	2.3.2.1
Core Spray System	2.3.2.2
Reactor Core Isolation Cooling System (Quad Cities only)	2.3.2.4
Isolation Condenser (Dresden only)	2.3.2.5
Residual Heat Removal System (Quad Cities only)	2.3.2.6
Low Pressure Coolant Injection System (Dresden only)	2.3.2.7
Standby Liquid Control System	2.3.2.8
Shutdown Cooling System (Dresden only)	2.3.3.2
Control Rod Drive Hydraulic System	2.3.3.3
Reactor Water Cleanup System	2.3.3.4
Main Steam System	2.3.4.1
Feedwater System	2.3.4.2

2.3.1.3.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.3, Dresden UFSAR Sections 5.4.1, 7.6.2, and 5.4.15, and Quad Cities UFSAR Sections 5.4.1 and 7.6.2 to determine whether there is reasonable assurance that the reactor coolant system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described as below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel internals and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the structures and components that were identified as not being within the scope of license renewal to verify that:

1. these structures and components do not have any of the intended functions delineated under 10 CFR 54.4(a), and

2. for those structures and components that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any function(s) delineated under 10 CFR 54.4(a) that were not identified as intended function(s) in the LRA, to verify that the SSCs with such function(s) will be adequately managed so that the function(s) will be maintained consistent with the CLB for the extended period of operation.

After completing the initial review, the staff requested the applicant to provide additional information on the reactor coolant system. By letter dated October 3, 2003 (Ref. 1), the applicant responded to the staff's request for additional information (RAI) as discussed below:

In RAI 2.3.1.3-1, the staff requested the applicant to verify whether the pumps at Quad Cities and/or Dresden, such as the recirculation pumps, are designed with lube motor-oil collection systems, as required under 10 CFR 50, App. R, III O. If they are, please justify its exclusion from aging management; otherwise, submit an AMR for the subject component. In response, the applicant stated the reactor recirculation pumps at Quad Cities and Dresden are not equipped with oil collection systems and do not need such systems to comply with 10 CFR 50, App. R, III O. 10 CFR 50, App. R, III O requires that the reactor coolant pump (reactor recirculation pump at Quad Cities and Dresden) be equipped with an oil collection system if the containment is not inerted during normal operation. The reactor recirculation pumps at Quad Cities and Dresden are located in the drywell portions of the primary containment, which are inerted during normal operation. The Quad Cities and Dresden Fire Hazards Analysis Reports sections for Fire Zones 1.2.1 and 1.2.2 state that there is no design-basis fire postulated for the drywell since the drywell atmosphere is inerted during normal reactor operation. Therefore, there is no need to identify such a component in the LRA. Based on the above discussion, the staff finds the applicant's assessment acceptable.

Updated Final Safety Analysis Reports (UFSARs) for Dresden and Quad Cities do identify the reactor vessel nozzles, safe ends, vessel shell attachments, and instrumentation penetrations at these plants, but it is not clear whether all of these components are included in Table 2.3.1-1 of the LRA. In RAI 2.3.1.3-2, the staff requested the applicant to explicitly identify all of the nozzles, safe ends, vessel shell attachments and instrumentation penetrations included in Component Groups "Nozzles," "Nozzle Safe Ends" (including core delta P/SLC nozzle safe end), "Vessel Shell attachment welds," and "Penetrations" (bottom head drain, CRD stub tubes, incore instrument housings, jet pump instrumentation, other instrumentation, standby liquid control), respectively. In response, the applicant identifies the individual components included in the LRA Table 2.3.1-1. The following list Industry Component Type line items are as shown in bolded and underlined text. In some cases generic components were created to represent a population of components, as for example the CRD stub tubes. Also, there are nozzles included in the component group, "Top Head Enclosure (Top Head Nozzles)." Therefore, although not requested, the individual components for this group are also provided.

All the nozzles identified on page 3 of Quad Cities UFSAR Section 5, Appendix 5A, "Reactor Vessel Report," and on page 11 of Dresden UFSAR Section 5, Appendix 5A, "Dresden 2 Reactor Vessel," are included in LRA Table 2.3.1-1 in the Component Groups of "Nozzles" and "Penetrations."

Nozzles (Component Intended Function of Pressure Boundary)

Unit	Equip No.	Equipment Name
Q1	1-0201-N1	Recirculation Outlet Nozzles
Q1	1-0201-N2	Recirculation Discharge Nozzles
Q1	1-0201-N3	Main Steam Nozzles
Q1	1-0201-N4	Feedwater Nozzles
Q1	1-0201-N5	Core Spray Nozzles
Q1	1-0201-N9	CRD Return Line Nozzles
Q2	2-0201-N1	Recirculation Nozzles
Q2	2-0201-N2	Recirculation Discharge Nozzles
Q2	2-0201-N3	Main Steam Nozzles
Q2	2-0201-N4	Feedwater Nozzles
Q2	2-0201-N5	Core Spray Nozzles
Q2	2-0201-N9	CRD Return Line Nozzles
D2	2-0201-N1	Recirculation Nozzles
D2	2-0201-N2	Recirculation Discharge Nozzles
D2	2-0201-N3	Main Steam Nozzles
D2	2-0201-N4	Feedwater Nozzles
D2	2-0201-N5	Core Spray Nozzles
D2	2-0201-N9	CRD Return Line Nozzles
D2	2-0201-N17	Isolation Condenser Nozzles
D3	3-0201-N1	Recirculation Suction Nozzles
D3	3-0201-N2	Recirculation Discharge Nozzles
D3	3-0201-N3	Main Steam Nozzles
D3	3-0201-N4	Feedwater Nozzles
D3	3-0201-N5	Core Spray Nozzles
D3	3-0201-N9	CRD Return Line Nozzles
D3	3-0201-N17	Isolation Condenser Nozzles

Nozzle Safe Ends (Component Intended Function of Pressure Boundary)

Unit	Equip No.	Equipment Name
Q1	1-0201-N1-SE	Recirculation Suction Nozzle Safe Ends
Q1	1-0201-N2-SE	Recirculation Discharge Nozzle Safe Ends
Q1	1-0201-N3-SE	Main Steam Nozzle Safe Ends
Q1	1-0201-N4-SE	Feedwater Nozzle Safe Ends
Q1	1-0201-N5-SE	Core Spray Nozzle Safe Ends
Q1	1-0201-N5-SEEXT	Core Spray Nozzle Safe End Extension
Q1	1-0201-N6B-SE	Vessel Head Instrumentation Nozzle Safe End
Q1	1-0201-N7-SE	Vent Nozzle N7 Safe End
Q1	2-0201-N8-SE	Jet Pump Instrumentation Nozzle Safe Ends
Q1	1-0201-N9-SE	CRD Return Line Nozzle Safe End
Q1	1-0201-N10-SE	Core Delta P & SLC Nozzle Safe Ends
Q1	1-0201-N11/12-SE	Instrumentation Nozzle Safe Ends
Q2	2-0201-N1-SE	Recirculation Suction Nozzle Safe Ends
Q2	2-0201-N2-SE	Recirculation Discharge Nozzle Safe Ends
Q2	2-0201-N3-SE	Main Steam Nozzle Safe Ends
Q2	2-0201-N4-SE	Feedwater Nozzle Safe Ends
Q2	2-0201-N5-SE	Core Spray Nozzle Safe Ends
Q2	2-0201-N5-SEEXT	Core Spray Nozzle Safe End Extension
Q2	2-0201-N6B-SE	Vessel Head Instrumentation Nozzle Safe End
Q2	2-0201-N7-SE	Vent Nozzle N7 Safe End
Q2	2-0201-N8-SE	Jet Pump Instrumentation Nozzle Safe Ends
Q2	2-0201-N9-SE	CRD Return Line Nozzle Safe End
Q2	2-0201-N10-SE	Core Delta P & SLC Nozzle Safe Ends
Q2	2-0201-N11/12-SE	Instrumentation Nozzle Safe Ends
D2	2-0201-N1-SE	Recirculation Suction Nozzle Safe Ends
D2	2-0201-N2-SE	Recirculation Discharge Nozzle Safe Ends
D2	2-0201-N3-SE	Main Steam Nozzle Safe Ends
D2	2-0201-N4-SE	Feedwater Nozzle Safe Ends
D2	2-0201-N5-SE	Core Spray Nozzle Safe Ends
D2	2-0201-N5-SEEXT	Core Spray Nozzle Safe End Extension
D2	2-0201-N6B-SE	Vessel Head Instrumentation Nozzle Safe End
D2	2-0201-N7-SE	Vent Nozzle Safe End
D2	2-0201-N8-SE	Jet Pump Instrumentation Nozzle Safe Ends
D2	2-0201-N9-SE	CRD Return Line Nozzle Safe End
D2	2-0201-N10-SE	Core Delta P & SLC Nozzle Safe End
D2	2-0201-N11/12-SE	Instrumentation Nozzle Safe Ends
D2	2-0201-N17-SE	Isolation Condenser Nozzle Safe End
D3	3-0201-N1-SE	Recirculation Suction Nozzle Safe Ends
D3	3-0201-N2-SE	Recirculation Discharge Nozzle Safe Ends
D3	3-0201-N3-SE	Main Steam Nozzle Safe Ends
D3	3-0201-N4-SE	Feedwater Nozzle Safe Ends
D3	3-0201-N5-SE	Core Spray Nozzle Safe Ends
D3	3-0201-N5-SEEXT	Core Spray Nozzle Safe End Extension
D3	3-0201-N6B-SE	Vessel Head Instrumentation Nozzle Safe End
D3	3-0201-N7-SE	Vent Nozzle Safe End
D3	3-0201-N8-SE	Jet Pump Instrumentation Nozzle Safe Ends
D3	3-0201-N9-SE	CRD Return Line Nozzle Safe End

D3	3-0201-N10-SE	Core Delta P & SLC Nozzle Safe End
D3	3-0201-N11/12-SE	Instrumentation Nozzle Safe Ends
D3	3-0201-N17-SE	Isolation Condenser Nozzle Safe End

Vessel Shell Attachment Welds (Component Intended Function of Structural Support)
Generic Components were created for the attachment welds on each unit at each site:

Unit	Equip No.	Equipment Name
Q1	1-0201-LR037	Attachment Welds
Q2	2-0201-LR037	Attachment Welds
D2	2-0201-LR037	Attachment Welds
D3	3-0201-LR037	Attachment Welds

Penetrations (Component Intended Function of Pressure Boundary)

Unit	Equip No.	Equipment Name
Q1	1-0201-12	Housing In-Core Penetrations
Q1	1-0201-LR038	CRD Stub Tube Penetrations
Q1	1-0201-N8	Jet Pump Instrumentation Nozzle Penetrations
Q1	1-0201-N10	Core Delta P & SLC Nozzle Penetrations
Q1	1-0201-N11/12	Instrumentation Nozzle Penetrations
Q1	1-0201-N15	Bottom Head Drain Nozzle Penetrations
Q2	2-0201-12	Housing In-Core Penetrations
Q2	2-0201-LR038	CRD Stub Tube Penetrations
Q2	2-0201-N8	Jet Pump Instrumentation Nozzles Penetrations
Q2	2-0201-N10	Core Delta P & SLC Nozzle Penetrations
Q2	2-0201-N11/12	Instrumentation Nozzle Penetrations
Q2	2-0201-N15	Bottom Head Drain Nozzle Penetrations
D2	2-0201-12	Housing In-Core Penetrations
D2	2-0201-LR038	CRD Stub Tube Penetrations
D2	2-0201-N8	Jet Pump Instrumentation Nozzle Penetrations
D2	2-0201-N10	Core Delta P & SLC Nozzle Penetrations
D2	2-0201-N11/12	Instrumentation Nozzle Penetrations
D2	2-0201-N15	Bottom Head Drain Nozzle Penetrations
D3	3-0201-12	Housing In-Core Penetrations
D3	3-0201-LR038	CRD stub tube Penetrations
D3	3-0201-N8	Jet Pump Instrumentation Nozzle Penetrations
D3	3-0201-N10	Core Delta P & SLC Nozzle Penetrations
D3	3-0201-N11/12	Instrumentation Nozzle Penetrations
D3	3-0201-N15	Bottom Head Drain Nozzle Penetrations

Penetrations (Control Rod Drive Stub Tubes) (Component Intended Function of Structural Support)
Generic Components were created for the CRD stub tubes on each unit at each site:

Unit	Equip No.	Equipment Name
Q1	1-0201-LR038	CRD Stub Tube Penetrations
Q2	2-0201-LR038	CRD Stub Tube Penetrations
D2	2-0201-LR038	CRD Stub Tube Penetrations
D3	3-0201-LR038	CRD Stub Tube Penetrations

Top Head Enclosure (Top Head Nozzles) (Component Intended Function of Pressure Boundary)

Unit	Equip No.	Equipment Name
Q1	1-0201-N6B	Vessel Head Instrumentation Nozzle
Q1	1-0201-N7	Vent Nozzle N7
Q2	2-0201-N6B	Vessel Head Instrumentation Nozzle
Q2	2-0201-N7	Vent Nozzle N7
D2	2-0201-N6B	Vessel Head Instrumentation Nozzle
D2	2-0201-N7	Vent Nozzle
D3	3-0201-N6B	Vessel Head Instrumentation Nozzle
D3	3-0201-N7	Vent Nozzle

Based on the above discussion, the staff finds the applicant's assessment acceptable.

One of the intended functions of the main steam line flow restrictors is to limit steam line flow during a steam line rupture outside of primary containment until the MSIVs [main stream isolation valves] can close, thereby limiting potential radioactive release. Over the extended life of the plant, it is therefore essential to maintain the flow area of the flow restrictors used in the CLB [current licensing basis] to calculate the amount of steam released. The staff believes that erosion/corrosion due to high energy steam flow can eventually increase this flow area beyond the value used in the CLB. In RAI 2.3.1.3-3, the staff requested the applicant to provide the following information:

a) Are the main steam line flow restrictors, and their flow restriction function, within scope? If not, please explain why not.

b) If in scope, how will the applicant determine that the flow area does not exceed more than the value used in the CLB, so that the intended functions will be maintained consistent with the CLB for the period of extended operation?

The applicant provided the following response:

a) The main steam line flow restrictors are within the scope of license renewal. They are listed as components in two line items in LRA Table 2.3.4-1 because they have two intended functions. They are included in the component group "Flow Elements," with a component intended function of "Pressure Boundary." They are also included in the component group "Flow Elements," with a component intended function of "Throttle."

b) The main steam line flow restrictors are constructed of an external carbon steel pipe segment, with an internal venturi-type flow element welded into it. The venturi flow element is comprised of stainless steel.

The entry in the LRA Table 2.3.4-1 Component Group "Flow Elements," with a component intended function of "Pressure Boundary" is for the carbon steel pipe segment that comprises the pressure boundary. The LRA Chapter 3 Aging Management References are 3.1.1.11 and 3.4.2.6. The internal aging effect/aging mechanism is wall thinning due to flow-accelerated corrosion, and is managed by the flow-accelerated corrosion program, as described in LRA Appendix B, Section B.1.11. The external environment for the pipe segment is "containment nitrogen," and there are no identified aging effects/aging mechanisms for this environment.

The entry in the Component Group "Flow Elements," with a component intended function of "Throttle" is for the internal stainless steel venturi-type flow element. The LRA Chapter 3 Aging Management Reference is 3.1.1.15. The aging effect/aging mechanism is crack initiation and growth due to SSCS, IGSCC. It is managed by the BWR stress corrosion cracking program as described in LRA Appendix B, Section B.1.7, and by the water chemistry program as described LRA Appendix B, Section B.1.2. EPRI 1003056, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Appendix A - Treated Water, Section 3.1.6, states that stainless steels used in treated water environments are resistant to FAC.

Based on this discussion, the staff finds the above applicant's assessment acceptable.

The staff did not identify any omissions.

2.3.1.3.3 Conclusions

The staff reviewed the LRA and the accompanying scoping boundary drawings to determine whether any structures, systems, or components that should be within the scope of license renewal were not identified by the applicant. The staff did not identify any omissions. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor coolant system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the reactor coolant system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.1.4 Evaluation Findings

On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the reactor coolant systems and components that are within the scope of license renewal, in accordance with the requirements of 10 CFR 54.4(a), and that the applicant has adequately identified the reactor coolant system components that are subject to an AMR, in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.1.5 References

1. Letter from Patrick R. Simpson (Exelon) to the NRC, "Additional Information for the Review of the License Renewal Applications for Quad Cities Nuclear Power Station, Units 1 and 2 and Dresden Nuclear Power Station, Units 2 and 3," October 3, 2003 (Accession No. ML032810692).

2. Letter from Patrick R. Simpson (Exelon) to the NRC, "Additional Information for the Review of the License Renewal Applications for Quad Cities Nuclear Power Station, Units 1 and 2 and Dresden Nuclear Power Station, Units 2 and 3," October 3, 2003 (Accession No. ML032810563).

3. Letter from Patrick R. Simpson (Exelon) to the NRC, "Follow-up Response to License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations," June 6, 2004 (Accession No. ML041820207).

2.3.2 Engineered Safety Features Systems

2.3.2.1 High-Pressure Coolant Injection System

2.3.2.1.1 Summary of Technical Information in the Application

The applicant described the high-pressure coolant injection (HPCI) system in LRA Section 2.3.2.1 and provided a list of components subject to an AMR in LRA Table 2.3.2-1.

The HPCI system ensures that adequate core cooling takes place for all break sizes less than those sizes for which the low-pressure coolant injection or core spray subsystems can adequately protect the core. Operation of the HPCI system in the emergency mode is completely independent of alternating current (ac) power.

The HPCI system consists of a steam turbine driving a multi-stage high-pressure main pump and a gear driven single-stage booster pump, piping, auxiliary support systems, and instrumentation. The turbine is driven by nuclear steam and exhausts to the suppression chamber (evaluated with the primary containment structure). The preferred water source to the HPCI booster pump suction is supplied from the condensate storage system (evaluated with the condensate and condensate storage system), with a backup source from the suppression chamber. Water from the HPCI main pump is delivered to the reactor vessel (evaluated with the reactor vessel) through the "B" feedwater line (evaluated with the feedwater system) and distributed within the reactor vessel through the feedwater sparger (evaluated with reactor internals). The system is equipped with a test line to the condensate storage system to permit functional testing and a minimum flow bypass line to the suppression chamber for pump protection.

Intended functions within the scope of license renewal include the following:

- core cooling—provides cooling water to the reactor vessel during loss of coolant (LOCA) conditions that do not result in rapid depressurization of the reactor pressure vessel and provides coolant inventory makeup in non-LOCA events

- pressure control—provides pressure control in events where the main steam isolation valves are closed

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment

- credited in regulated event(s)—provides core makeup, cooling, and pressure control credited in mitigation of the Appendix R fire, ATWS, and SBO events; also contains components that are relied upon for compliance with 10 CFR 50.49 (EQ)

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

Table 2.3.2-1 of the LRA identified the component groups requiring AMR. The component groups identified for HPCI include:

- closure bolting
- dampeners (Quad Cities only)
- diffusers
- filters/strainers (includes separators, pressure boundary)
- filters/strainers (includes separators, filter)
- flexible hoses
- flow orifices
- heat exchangers (includes condensers, pressure boundary)
- heat exchangers (includes condensers, heat transfer)
- NSR vents or drains, piping, and valves (attached support)
- piping and fittings (includes thermowells)
- piping and fittings (attached support)
- piping and fittings (small bore)
- pumps
- restricting orifices (pressure boundary)
- restricting orifices (throttle)
- restricting orifices (attached support)
- rupture discs
- sight glasses (attached support)
- sight glasses (Quad Cities only)
- tanks
- thermowells
- traps
- tubing
- tubing (attached support)
- turbine casings
- valves
- valves (attached support)

2.3.2.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.1, Dresden UFSAR Sections 6.3.1 and 6.3.2, and Quad Cities UFSAR Sections 6.3.1 and 6.3.2 to determine whether there is reasonable assurance that the HPCI system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In performing the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the SCs that were identified as not being within the scope of license renewal to verify that (1) these structures and components do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those structures and components that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that were not identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

2.3.2.1.3 Conclusions

The staff reviewed LRA Section 2.3.2.1 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the HPCI system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the HPCI system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.2 Core Spray System

2.3.2.2.1 Summary of Technical Information in the Application

The applicant described the core spray (CS) system components in LRA Section 2.3.2.2 and provides a list of components subject to an AMR in LRA Table 2.3.2-2.

The CS system provided core cooling for intermediate and large line break sizes. Two independent CS loops are provided to ensure adequate core cooling. Each CS loop is designed to operate in conjunction with LPCI and either the automatic depressurization system or high-pressure coolant injection system to provide adequate core cooling over the entire spectrum of liquid or steam break sizes.

The CS system consists of two independent loops, each with a motor-driven pump, associated piping, valves, and instrumentation. The normal water source is supplied from the suppression chamber (evaluated with the primary containment structure). An alternate water source is the condensate storage system (evaluated with the condensate and condensate storage system). The CS system delivers water directly to the reactor vessel (evaluated with the reactor vessel) onto the top of the fuel assemblies through the CS spargers (evaluated with reactor internals). Each CS loop is equipped with a test return line to the suppression chamber to permit functional testing and a minimum flow bypass line to the suppression chamber for pump protection.

Intended functions within the scope of license renewal include the following:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary

- core cooling—in conjunction with LPCI and either automatic depressurization or high-pressure coolant injection, provides emergency core cooling for the entire spectrum of postulated design-basis LOCAs

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment

- supports ESF function(s)—provides an ECCS keep fill subsystem which maintains core spray and LPCI piping full of water to support a condition of standby readiness

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

- credited in regulated event(s)—contains components that are relied upon for compliance with 10 CFR 50.49 (EQ)

Table 2.3.2-2 of the LRA identified the component groups requiring AMR. The component groups identified for CS include the following:

- closure bolting
- flow elements (pressure boundary)
- flow elements (throttle)
- NSR vents or drains, piping, and valves (attached support)
- piping and fittings
- piping and fittings (attached support)
- pumps
- restricting orifices (pressure boundary
- restricting orifices (throttle)
- sight glasses (attached support)
- thermowells
- tubing
- tubing (attached support, Quad Cities only)
- valves
- valves (attached support)

2.3.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.2, Dresden UFSAR Sections 6.3.1 and 6.3.2, and Quad Cities UFSAR Sections 6.3.1 and 6.3.2 to determine whether there is reasonable assurance that the components of the CS system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the structures and components that were identified as not being within the scope of license renewal to verify that (1) these structures and components do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those structures and components that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that were not identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

After completing the initial review, the staff requested the applicant to provide additional information on the CS system. By letter dated October 3, 2003 (Ref. 1), the applicant responded to the staff's RAI as discussed below.

High-radiation sampling system piping and liquid sampling flow diagram LR-QDC-M-1061-1 does not include check valve 2-1402-71 within the scope of license renewal. This valve prevents the backflow of water from the ESS fill pump discharge line back to the condensate transfer pump supply line. Failure of this valve could prevent the ESS fill pump system from supporting its intended ESF function. In RAI 2.3.2.2-1, the staff requested the applicant to explain why this component is not within the scope of the license renewal program. In response, the applicant stated that valve 2-1402-71 is included within the scope of license renewal and is subject to AMR. Boundary diagram LR-QDC-M-78 (coordinate E-7) includes valve 2-1402-71 as within the scope of license renewal requiring AMR. Check valve 2-1402-70 (not shown on LR-QDC-M-1061-1) serves as the safety-related pressure boundary that prevents the backflow of water from the ECCS keep fill pump discharge line from entering the condensate transfer system. Valve 2-1402-71 is addressed in Table 2.3.2-2 under the component group "valves (attached support)."

Valve 2-1402-70 is addressed in Table 2.3.2-2, under the component group "valves". High-radiation sampling system piping and liquid sampling boundary diagram, LR-QDC-1061-1, is a continuation boundary diagram where valve 2-1402-71 is shown as a dotted line for information only. The ECCS keep fill pump system intended function is therefore not jeopardized. Boundary diagram LR-QDC-1061-1 should have highlighted check valve 2-1402-70 indicating that it falls within the scope of license renewal. Based on this discussion, the staff finds the applicant's assessment acceptable.

Demineralized water system flow diagram LR-DRE-M-366 does not include the suction line, 3-3329-A-B-L, and suction isolation valve, 3-3329-A-500, for condensate makeup pump 3-3318-B within the scope of license renewal. Failure of these system boundary components could prevent the demineralized water system from performing its ESF function. In RAI 2.3.2.2-2, the staff requested the applicant to explain why these components are not within the scope of the license renewal program. In response, the applicant stated that Exelon has reviewed the demineralized water system boundary diagram LR-DRE-M-366 for Dresden and the following clarification is provided:

> Demineralized water system boundary diagram LR-DRE-M-366 should have highlighted suction line, 3-3329-A-8-L, and suction isolation valve, 3-3329-A-500, for condensate make-up pump 3-3318-A and included those components within the scope of license renewal. The suction line and the suction isolation valve are included in the scope of license renewal and are subject to AMR. The suction piping and isolation valve are addressed in LRA Section 2.3.4.3, Table 2.3.4-3 under the Component Groups "Piping and Fittings" and "Valves". Aging Management Reference 3.4.1.3 discusses the aging management of the suction piping and isolation valve external surfaces as a carbon steel component. Aging Management References 3.4.1.2 and 3.4.1.4 discuss the aging management of the suction piping and isolation valve internal surfaces.

Based on this discussion, the staff finds the applicant's assessment acceptable.

2.3.2.2.3 Conclusions

The staff reviewed Section 2.3.2.2 of the LRA and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the CS system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the CS system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.3 Containment Isolation Components and Primary Containment Piping System

2.3.2.3.1 Summary of Technical Information in the Application

The applicant described the containment isolation components and primary containment piping system in LRA Section 2.3.2.3 and provided a list of components subject to an AMR in LRA Table 2.3.2-3.

The containment isolation components and primary containment piping system is a composite support system for the primary containment structure. The containment isolation components and primary containment piping system comprises primary containment isolation valves, penetrations, and piping from non-safety-related systems that perform no intended function except primary containment isolation. It also includes safety-related piping, components, and instrumentation that directly support intended functions of the primary containment structure and that are not assigned to other systems in the scope of license renewal. The containment isolation components and primary containment piping system ensures that the primary containment structure can perform its intended functions.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following intended functions of the containment isolation components and primary containment piping system:

- primary containment isolation—provides functions that support isolation

- pressure suppression—provides functions that support absorption of energy by containment air and water volumes

- containment integrity—provides vacuum relief between drywell, suppression chamber, and reactor building

- preclude adverse effects on safety-related SSCs

- credited in regulated events—components relied upon for compliance with 10 CFR 50.49 (EQ)

In the event of a nuclear steam supply system piping failure within the drywell (evaluated with the primary containment structure), reactor water and/or steam would be released into the drywell. The resulting increased drywell pressure would force a mixture of radioactive materials, noncondensible gases, steam, and water through the connecting vent lines into the chamber of water in the suppression chamber, which is also called the torus (evaluated with the primary containment structure). The steam would condense rapidly and completely in the suppression chamber resulting in suppression of the pressure increase in the drywell. During this period, the primary containment and suppression chamber piping isolation valves are relied upon to ensure the containment of these gases and liquids.

The containment isolation components and primary containment piping system consists of: primary containment pressure instruments; suppression chamber to reactor building vacuum breaker lines; purge supply and exhaust penetrations (HVAC—primary containment); suppression chamber level instrumentation penetrations; local leak-rate test (LLRT) penetrations; and containment isolation barriers from the traversing in-core probe, drywell equipment and floor drain sumps, atmospheric containment air dilution (ACAD), service air, and instrument air systems. All associated piping, components, and instrumentation contained within the flow paths and systems described above are included in the primary containment and suppression chamber piping system evaluation boundary.

In LRA Section 2.3.2.3, the applicant described the evaluation boundary of the containment isolation components and primary containment piping system. In addition, the applicant highlighted those portions of the system and its structures and components that are within the scope of the Rule in the P&IDs listed as references in LRA Section 2.3.2.3. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the containment isolation components and primary containment piping system in LRA Table 2.3.2.3 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- flexible hoses and flow elements (pressure boundary, Quad Cities only)
- isolation barriers including piping, tubing, valves, and vacuum breakers (pressure boundary)
- isolation barriers—attached support including piping and valves (structural integrity)
- NSR vents or drains, piping, and valves (structure integrity/attached support)
- piping and fittings (structure integrity/attached support)
- piping and fittings (pressure boundary)
- restricted orifices (pressure boundary, Dresden only)
- tanks including drain pot (pressure boundary)
- thermowells (pressure boundary, Dresden only)

- tubing (pressure boundary)

2.3.2.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.3, Dresden UFSAR Section 6.2.1, and Quad Cities UFSAR Section 6.2.1 to determine whether there is reasonable assurance that the components of the containment isolation components and primary containment piping system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the containment isolation components and primary containment piping system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the containment isolation components and primary containment piping system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&IDs to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&IDs were representative of the containment isolation components and primary containment piping system. The staff then reviewed the referenced P&IDs to verify that those portions of the containment isolation components and primary containment piping system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.2.3, and that the applicant identified all system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.3 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by letter on August 4, 2003, the staff issued RAIs to the applicant concerning specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses, dated October 3, 2003, are described below.

<u>RAI 2.3.2.3-1</u>. On instrument air piping diagram LR-QDC-M-24-12, line 1-47209-1" is shown within the scope of the containment isolation components (primary containment (PC)) system that requires an AMR because it provides a safety-related pressure-retaining function. Lines 1-47692-1 and 1-4315A which are connected to line 1-470209-1 are not shown in the PC system to require an AMR. Similarly for Unit 2, lines 2-47692, 2-4315A, and 2-47209A which are connected to line 2-470209 on diagram LR-QDC-M-71-7 are not shown in the PC system to require an AMR. The staff asked the applicant to provide an AMR for these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.3-1 stated that those portions of instrument air lines 1-47209-1"-T and 2-47209-1"-T shaded in red on boundary diagrams LR-QDC-M-24-12 and LR-QDC-M-71-7 are non-safety-related. These lines are attached to safety-related portions of lines 1-47209-1"-T and 2-47209-1"-T, as shown on boundary diagrams LR-QDC-M-24-13 and LR-QDC-M-71-8. Those portions of the lines colored in red provide structural support to the safety-related portions of piping colored in green. The non-safety-related piping and components and components on lines 1-47209-1"-T and 2-47209-1"-T extend up to the first support in each of the three orthogonal directions. A failure in lines 1-47692-1 1/4", 1-4315A-1/4"-L, 2-47692-1 1/4", or 2-4315A-1/4"-L would not have any impact on the structural integrity of the safety-related piping and components. Additionally, failure of these lines would not impact the intended function of any safety-related systems. Safety-related valves that rely upon instrument air fail in the safe position. Therefore, these lines are not within the scope of license renewal and do not require an AMR.

Based on its review, the staff concurs with the applicant's clarification that a failure in the above-cited instrument air lines would not have any impact on the structural integrity of the safety-related piping and components and the intended function of any safety-related systems. In accordance with criteria set forth in 10 CFR 54.4, these lines are not within the scope of license renewal and do not require an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.2.3-1 acceptable and considers its concern described in RAI 2.3.2.3-1 resolved.

RAI 2.3.2.3-2. Instrument air piping diagram LR-QDC-M-24-13 does not show boundary breaks between PC system components that may require an AMR and instrument air (IA) components. The staff asked the applicant to identify the PC system component boundary breaks and to identify where the LRA addresses the AMR for these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.3-2 stated that all of the piping and piping components colored in red and green on boundary diagram LR-QDC-M-24-13 have been included within the scope of license renewal and require an AMR. These components were evaluated within the PC system boundary. All components highlighted in green are safety-related. All components highlighted in red are non-safety-related components attached to safety-related components providing structural support. The non-safety-related components providing structural support include all components up to the first support in each of the three orthogonal directions. Therefore, portions of piping highlighted in red end abruptly at some locations. Piping and piping components that are colored in black are IA system components that are not included within the scope of license renewal and do not require an AMR. Instrument air boundary diagram LR-QDC-M-24-13 should have been corrected to include the boundary flags designating breaks between PC system components and IA system components. Those components that are highlighted in green and red are included in LRA Table 2.3.2-3 as being within the scope of license renewal and subject to an AMR.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.3-2 acceptable because the applicant clearly identified the PC system component boundary breaks, and the piping and components that are within the scope of license renewal are included in LRA Table 2.3.2-3 as subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.2.3-2 resolved.

RAI 2.3.2.3-3. On diagram LR-QDC-M-71-8, line 2-47209-1" (E-7) and line 2-4700-2" (D-10) are shown within the scope of PC system components that require an AMR because they provide a safety-related pressure-retaining function. Lines 2-47775 and 2-47498 which are connected to lines 2-47209 and 2-4700 are not in the PC system requiring an AMR. The staff asked the applicant to identify where the LRA addresses the AMR for these components or to provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.3-3 stated that those portions of lines 2-47209-1" and 2-4700-2" shown on boundary diagram LR-QDC-M-71-8 that are highlighted in green are safety-related and provide a pressure-retaining function. The safety-related boundary pressure-retaining boundary ends at valves 2-4721 and 2-4799-156. Those portions of lines 2-47209-1" and 2-4700-2" highlighted in red are not safety-related and provide structural support for the safety-related portions of pipe. All components highlighted in green and red are included within the scope of license renewal and require aging management. The non-safety-related portions of piping falling within the scope of license renewal extended up to the first support in each of the three orthogonal directions. Therefore, the red highlighted lines appear to end abruptly. Field walkdowns performed by Exelon identified those structural interactions with the safety-related components that can affect the ability of SSCs to perform their intended functions. Failure of lines 2-47775-1/2" and 2-47498-3/4" would not have any impact on the structural integrity (interaction or attached) of the safety-related piping and components. Additionally, failure of these lines would not impact the intended function of any safety-related systems. Safety-related valves reliant upon instrument air fail in the safe position. Thus, these lines were not included within the scope of license renewal and do not require an AMR.

Based on its review, the staff concurs with the applicant's clarification that failure of lines 2-47775-1/2" and 2-47498-3/4" would not have any impact on the structural integrity of the safety-related piping and components and the intended function of any safety-related systems. In accordance with criteria set forth in 10 CFR 54.4, these lines are not within the scope of license renewal and do not require an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.2.3-3 acceptable and considers its concern described in RAI 2.3.2.3-3 resolved.

RAI 2.3.2.3-4. On liquid sampling system diagrams LR-QDC-M-1056-1 and LR-QDC-M-1061-1, boundary breaks between PC system components that require an AMR and other system components are not shown. The staff asked the applicant to identify the PC system component boundary breaks and identify where the LRA addresses the AMR for these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.3-4 stated that piping and piping components shown on boundary diagram LR-QDC-M-1056-1 highlighted in red or green fall within the scope of license renewal and require aging management. Those portions of pipe highlighted in red and green have been evaluated under various systems. For example, those portions of piping shown at locations B-7 and C-6 (includes valves 1-2099-417 and 1-2099-500) were evaluated with the PC system. These two stretches of pipe are bounded by high-radiation sampling system piping that falls outside the scope of license renewal. Those portions of pipe highlighted in red at location G-9 on boundary diagram LR-QDC-M-1056-1 (includes valve 1-8941-701) were evaluated with the reactor recirculation system. Those components highlighted in red are not safety-related but provide structural support to safety-related reactor recirculation system piping. Finally, those portions of pipe highlighted in green and red at location D-9 on boundary diagram LR-QDC-M-1056-1 (includes valve 1-1402-69) fall within the scope of license renewal and require aging management. Those components were evaluated with the core spray system and are bounded by high-radiation sampling system piping that falls outside the scope of license renewal. The piping highlighted in green is safety-related, and the piping highlighted in red is not safety-related but provides structural support to the safety-related pipe that is attached.

Piping and piping components shown on boundary diagram LR-QDC-M-1061-1 highlighted in red or green fall within the scope of license renewal and require aging management. Those portions of pipe highlighted in red and green have been evaluated under various systems. For example, those portions of piping shown at locations B-7 and C-6 (includes valves 2-2099-649 and 2-2099-394) were evaluated with the PC system. These two stretches of pipe are bounded by high-radiation sampling system piping that falls outside the scope of license renewal. Those portions of pipe highlighted in red at location G-9 on boundary diagram LR-QDC-M-1061-1 (includes valve 2-8941-721) were evaluated with the reactor recirculation system. Those components highlighted in red are not safety-related but provide structural support to safety-related reactor recirculation system piping. Finally, those portions of pipe highlighted in green and red at location D-9 on boundary diagram LR-QDC-M-1061-1 (includes valve 2-1402-69) fall within the scope of license renewal and require aging management. Those components were evaluated with the core spray system. These components are bounded by high-radiation sampling system piping that falls outside the scope of license renewal. The core spray system piping highlighted in green is safety-related, and the piping highlighted in red is not safety-related but provides structural support to the safety-related pipe that is attached.

Table 2.3.2-3 includes those components evaluated within the PC system boundary. Table 2.3.1.3-5 includes those components evaluated within the reactor recirculation system boundary. Table 2.3.2-2 includes those components evaluated within the core spray system boundary. Boundary diagrams LR-QDC-M-1056-1 and LR-QDC-M-1061-1 should have included the appropriate system boundary flags.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.3-4 acceptable because the applicant clearly identified the PC system component boundary breaks; the piping and components that are within the scope of license renewal and are evaluated within the PC system boundary are included in LRA Table 2.3.2-3 subject to an AMR; and the piping and components that are evaluated within the reactor recirculation system boundary are included in LRA Table 2.3.1.3-5. Therefore, the staff considers its concern described in RAI 2.3.2.3-4 resolved.

RAI 2.3.2.3-5. On radwaste ventilation diagram LR-DRE-M-272, boundary breaks between PC and RW system components are shown at location A-10, but no component in the PC system is shown to require an AMR. The staff asked the applicant to identify the PC system components on the above drawing and to identify where the LRA addresses the AMR for these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.3-5 stated that the components shown on boundary diagram LR-DRE-M-272 at coordinate A-9 were evaluated with the PC system and are connected to piping that is continued on the same diagram at coordinate F-3. This portion of non-safety-related piping is a continuation of piping from drawings LR-DRE-M-356 (coordinate A-1) and LR-DRE-M-25 (coordinate B-1). As shown on boundary diagrams LR-DRE-M-25 (B-1) and LR-DRE-M-356 (A-1), the PC system piping highlighted in green is safety-related and provides a pressure-retaining function. Those portions of lines 2-1656-10" and 3-1656-10" highlighted in red on boundary diagrams LR-DRE-M-25 (B-1) and LR-DRE-M-356 (A-1) are not safety-related and provide structural support for the safety-related portions of pipe colored in green. The non-safety-related pipe colored in red falls within the scope of license renewal and extends up to the first support in each of the three orthogonal directions. The piping continues beyond the first seismic anchor on diagrams LR-DRE-M-25 and LR-DRE-M-356 and continues on to boundary diagram LR-DRE-M-272. The purpose of the boundary flags on boundary diagram LR-DRE-M-272 is to identify the extent of the PC system boundary. Failure of piping and piping components shown on boundary diagram LR-DRE-M-272 would not have any impact on the structural integrity or intended function of the safety-related piping and components in the PC system. As such, the PC system components on boundary diagram LR DRE-M-272 were not included within the scope of license renewal and do not require an AMR.

Based on its review, the staff concurs with the applicant's clarification that failure of PC system piping and piping components shown on boundary diagram LR-DRE-M-272 would not have any impact on the structural integrity of the safety-related piping and components and the intended function of any safety-related systems. In accordance with criteria set forth in 10 CFR 54.4, PC system piping and piping components shown on boundary diagram LR-DRE-M-272 are not within the scope of license renewal and do not require an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.2.3-5 acceptable and considers its concern described in RAI 2.3.2.3-5 resolved.

2.3.2.3.3 Conclusions

The staff reviewed LRA Section 2.3.2.3, the accompanying scoping boundary drawings and the applicant's response to RAIs dated October 3, 2003, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the containment isolation components and primary containment piping systems that are within the scope of license renewal, as required by 10 CFR 54.4, and that the applicant has adequately identified the components of the containment isolation components and primary containment piping systems that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.4 Reactor Core Isolation Cooling System—Quad Cities Only

2.3.2.4.1 Summary of Technical Information in the Application

The applicant described the reactor core isolation cooling (RCIC) system components in LRA Section 2.3.2.4 and provided a list of components subject to an AMR in LRA Table 2.3.2-4.

The RCIC system at Quad Cities provides cooling water to the reactor core in the event of a postulated isolation of the reactor from the main condenser with a loss of reactor feedwater.

The RCIC system consists of a steam turbine-pump unit, piping, associated valves, auxiliary support systems, and instrumentation. The turbine is driven by nuclear steam supplied from the "A" main steam line on Unit 1 and from the "D" main steam line on Unit 2 (evaluated with main steam) and exhausts to the suppression chamber (evaluated with the primary containment structure), below the water line. All steam leakage from valve packing and the turbine shaft seals is routed to and condensed in the barometric condenser. The preferred water source to the RCIC pump suction is supplied from the condensate storage tank (evaluated under the condensate and condensate storage system), with a backup source from the suppression chamber (evaluated with the primary containment structure). The pump discharge is delivered into the reactor vessel through a connection to the "A" feedwater line (evaluated with the feedwater system) and is distributed within the vessel through the feedwater spargers (evaluated with reactor internals). A minimum flow bypass line from the pump discharge line to the suppression chamber is provided for pump protection. The RCIC system is equipped with a test line used for functional testing that returns condensate to the condensate storage tank. The RCIC test return line is tied to the HPCI system test return line (evaluated under the HPCI system). The RCIC auxiliaries include the drain pot subsystem, the barometric condenser and vacuum subsystem, and the turbine oil subsystem. The RCIC turbine and pump are located in a room with a CS pump, and the area is cooled by the CS room cooler (evaluated with ECCS corner room HVAC).

Intended functions within the scope of license renewal include the following:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment

- core cooling—provides cooling water to the core and provides capability for level and pressure control during normal reactor isolation conditions

- credited in regulated event(s)—provides core cooling, including capability for level and pressure control, credited in mitigation of the Appendix R fire, ATWS, and SBO events; also contains components relied upon for compliance with 10 CFR 50.49 (EQ)

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

Table 2.3.2-4 of the LRA identified the component groups requiring AMR. The component groups identified for RCIC include the following:

- closure bolting (Quad Cities only)
- dampeners (Quad Cities only)
- filters/strainers (pressure boundary, Quad Cities only)
- filters/strainers (filter, Quad Cities only)
- flexible hoses (Quad Cities only)
- NSR vents or drains, piping, and valves (attached support, Quad Cities only)

- piping and fittings (includes rupture discs, Quad Cities only)
- piping and fittings (small bore, Quad Cities only)
- pumps (Quad Cities only)
- restricting orifices (pressure boundary, Quad Cities only)
- restricting orifices (throttle, Quad Cities only)
- sight glasses (Quad Cities only)
- tanks (includes drain pots, actuators, and condensers, Quad Cities only)
- traps (Quad Cities only)
- tubing (Quad Cities only)
- turbine casings (Quad Cities only)
- valves (Quad Cities only)
- valves (small bore, Quad Cities only)

2.3.2.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.4 and Quad Cities UFSAR Section 5.4.6 to determine whether there is reasonable assurance that the components of the RCIC system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the structures and components that were identified as not being within the scope of license renewal to verify that (1) these structures and components do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those structures and components that have applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that were not identified as intended functions in the LRA to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

2.3.2.4.3 Conclusions

The staff reviewed LRA Section 2.3.2.4 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the components of the RCIC system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the RCIC system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.5 Isolation Condenser—Dresden Only

2.3.2.5.1 Summary of Technical Information in the Application

The applicant described the isolation condenser system components in LRA Section 2.3.2.5 and provided a list of components subject to an AMR in LRA Table 2.3.2-5.

The isolation condenser system at Dresden provides reactor core cooling in the event that the reactor becomes isolated from the turbine and main condenser by closure of the main steam isolation valves.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following intended isolation condenser system functions:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary
- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment
- credited in regulated event(s)—provides reactor pressure control and core cooling functions (in vessel isolation conditions) credited in mitigation of the Appendix R fire, ATWS, and SBO events; also contains components that are relied upon for compliance with 10 CFR 50.49 (EQ)
- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The isolation condenser is a heat exchanger, which consists of two tube bundles immersed in a large water storage tank. The isolation condenser system operates by natural circulation without the need for power other than direct current (dc) power to open the condensate return valve to initiate system operation. During isolation condenser system operation, steam flows through the isolation condenser steam supply line directly from the reactor vessel (evaluated with the reactor vessel), condenses in the tubes of the heat exchanger, and returns by gravity through the isolation condenser return line to the reactor via the "A" recirculation loop (evaluated with the reactor recirculation, recirculation flow control, and M/G sets system). Isolation valves are provided on the lines that penetrate the primary containment. The differential water head, created when the steam is condensed, serves as the driving force. The water on the shell side of the condenser boils and vents to the atmosphere. The tube side of the isolation condenser system is equipped with a high point vent which is used during normal operation to prevent the long-term buildup of noncondensible gases. These gases are vented to the "A" main steam line, downstream of the main steam line flow restrictor (venturi) (evaluated with the main steam system). The differential pressure across the venturi provides the driving force for the flow of steam and noncondensible gases from the tube side of the isolation condenser system to the main steam line. The preferred makeup water source is the clean demineralized water storage tank via two diesel-driven isolation condenser makeup water pumps. Alternate makeup water sources are the fire protection system (evaluated separately) and the condensate storage system (evaluated with the condensate and condensate storage system). Two radiation monitors (evaluated with the process radiation monitoring system) are provided on the shell vent. In the event of excessive radiation levels, the tube side of the heat exchanger can be isolated from the reactor.

In LRA Section 2.3.2.5, the applicant described the evaluation boundary of the isolation condenser system. In addition, the applicant highlighted those portions of the system and its structures and components that are within the scope of the Rule in the P&IDs listed as references in LRA Section 2.3.2.5. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the isolation condenser system in LRA Table 2.3.2.5 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary, Dresden only)
- isolation condensers (pressure boundary, Dresden only)
- isolation condensers (heat transfer)
- NSR vents or drains, piping, and valves (structure integrity/attached support, Dresden only)
- piping and fittings (structure integrity/attached support, Dresden only)
- piping and fittings (pressure boundary, Dresden only)
- piping and fittings small bore (pressure boundary, Dresden only)
- pumps (pressure boundary, Dresden only)
- flow elements (pressure boundary, Dresden only)
- sight glasses (pressure boundary, Dresden only)
- tanks (pressure boundary, Dresden only)
- thermowells (pressure boundary, Dresden only)
- tubing (pressure boundary, Dresden only)
- valves (pressure boundary, Dresden only)
- valves (structure integrity/attached support, Dresden only)

2.3.2.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.5 and Dresden USAR Section 5.4.6 to determine whether there is reasonable assurance that the components of the isolation condenser system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the isolation condenser system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the isolation condenser system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&IDs to the system drawings and system descriptions in the UFSAR to ensure that the referenced P&IDs were representative of the isolation condenser system. The staff then reviewed the referenced P&IDs to verify that those portions of the isolation condenser system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.2.5, and that the applicant identified all isolation condenser system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.5 identified areas in which additional information was necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by letter on August 4, 2003, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses, dated October 3, 2003, are described below.

RAI 2.3.2.5-1 (Dresden Units Only). For Unit 3, the system boundary between the isolation condenser and demineralized water makeup piping system for AMR is shown on flow diagram LR-DRE-M-359 (B-1) for line 3-4399-72. For Unit 2, the similar isolation boundary between the isolation condenser and demineralized water makeup piping system for AMR is not shown on flow diagram LR-DRE-M-28 (B-1) or on flow diagram M-35-1 (A-8) for line 2-4399-72. The staff asked the applicant to indicate the LR boundary for Unit 2 piping between the isolation condenser and demineralized water makeup system and to indicate where the LRA addresses the AMR of these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.5-1 stated that for Unit 3, the system boundary break between the isolation condenser and demineralized water makeup for AMR shown on boundary diagram LR-DRE-M-359 (B-1) for line 3-4388-4"-L (valve 3-4399-72) is correct and represents the boundary evaluated. For Unit 2, the same boundary break between the isolation condenser and demineralized water makeup system should have been shown on boundary diagram LR-DRE-M-28 (B-1) for line 2-4388-4"-L (Valve 2-4399-72). These components fall within the scope of license renewal. The components within the isolation condenser system boundary are included in LRA Table 2.3.2-5 under the component groups "piping and fittings (Dresden only)" and "valves (Dresden only)." The piping upstream of valve (2)3-4399-72 is evaluated in the demineralized water makeup system boundary and is included in LRA Table 2.3.3-19 under the component group "piping and fittings."

Based on its review, the staff concurs with the applicant's clarification that the above-cited segment of piping and its associated components in Unit 2 are within the scope of the Rule and subject to an AMR; they were inadvertently not highlighted in the LR boundary diagram; and their associated components are included in the appropriate LRA tables subject to an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.2.5-1 acceptable and considers its concern described in RAI 2.3.2.5-1 resolved.

RAI 2.3.2.5-2 (Dresden Units Only). The LR boundary for the clean demineralized water storage tank (2/3-4300) shown on flow diagram LR-DRE-M-35-1 for AMR is not clearly indicated, and, therefore, it is unclear whether the boundary is covered in the isolation condenser system or demineralized water system. The LR boundaries for line 2/3-43220-4"-H and for line to LI and LT indicate that it is covered in the isolation condenser system. The LR boundaries for line 2/3-43206-6"-H and for line 2/3 4301-3"-L indicate that it is covered in the demineralized water system. These safety-related components are relied upon to remain functional during and following the design-basis events to provide makeup water to the isolation condenser for cooling. The staff asked the applicant to indicate the LR boundary for the tank and connecting piping and identify where the LRA addresses the AMR for these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.5-2 stated that the clean demineralized water storage tank T-105B (2/3-4300) shown on boundary diagram LR-DRE-M-35-1 was evaluated with the isolation condenser system as stated in LRA Sections 2.3.2.5 and 2.3.3.19.

Piping and components associated with the clean demineralized water storage tank (T-105B) that provide flow path to the isolation condenser makeup pumps and receive recirculation flow return from the isolation condenser makeup pumps are evaluated in the isolation condenser system boundary. Piping and components from the tank connection for the level instruments (LI and LT) and the suction piping for the clean demineralizer water pumps (2/3-4301B-3"-L) from the tank were evaluated in the clean demineralizer system boundary. Line 2/3-4301B-3"-L has the same boundary breaks as those of the piping for the LI and LT, in that the boundary break is at the piping connection to the tank.

The LR boundary break for line 2/3-43206-6"-H (LR-DRE-M-35-1, E-9) shows that the piping connecting the tank to the isolation condenser makeup pumps (through lines 2/3-43216A-8"-H and 2/3-43216A-8"-H) was evaluated within the isolation condenser evaluation boundary. The portion of piping for line 2/3-43206-6"-H at coordinate E-9 that has been colored black should have been highlighted green to be in scope. This piping connects to valves 2/3-4399-329A/B on the suction side of dilution pumps. The piping up to and including the valves is evaluated with the makeup demineralizer system boundary for AMR.

The AMRs for those components evaluated with the isolation condenser system are included in LRA Table 2.3.2-5. They are included under the component groups of "tanks (Dresden only)," "valves (Dresden only)," and "piping and fittings (Dresden only)." The AMRs for those components evaluated with the makeup demineralizer system are included in LRA Table 2.3.3-19. They are included under the component groups of "valves," and "piping and fittings."

The components discussed above are not safety-related and are not credited in any design-basis event. The tank and the associated piping and components are within the scope of license renewal for compliance with the fire protection, ATWS, and SBO 10 CFR 54.4(a)(3) regulated events.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.5-2 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.5-2 resolved.

RAI 2.3.2.5-3 (Dresden Units Only). Table 2.3.2-5, "Component Groups Requiring Aging Management Review—Isolation Condenser (Dresden only)," does not list the vacuum breaker 2/3-4399-803 shown on isolation condenser makeup system flow diagram LR-DRE-M-4203 as the component requiring AMR. This safety-related component is relied upon to remain functional during and following the design-basis events to maintain the pressure boundary for the essential components. The staff asked the applicant to identify where the LRA addresses the AMR of this component or provide a justification for excluding this component from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.5-3 stated that vacuum breaker 2/3-4399-803, shown on isolation condenser makeup system boundary diagram LR-DRE-M-4203, falls within the scope of license renewal and is evaluated in LRA Table 2.3.2-5 under the component group "valves (Dresden only)."

The staff finds the applicant's clarification discussed above acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.5-3 resolved.

RAI 2.3.2.5-4 (Dresden Units Only). (a) Drawing LR-DRE-M-359, Isolation Condenser Piping, identifies two diaphragm seal components within the boundaries of license renewal; however, these components are not listed in the LRA tables described above. The staff asked the applicant to identify where the LRA addresses the AMR for these diaphragm seal components or provide a justification for excluding these components from an AMR.

(b) The Dresden isolation condenser system description mentions the presence of a loop seal and manway hatch as components in the isolation condenser system. Neither of these components is mentioned in Tables 2.3.2-5, 3.2-1, or 3.2-2 of the LRA. The staff asked the applicant to identify where the LRA addresses the AMR for these components or provide a justification for excluding these components from an AMR.

(c) Condensate piping diagram LR-QDC-M-16-5 does not include level switch isolation valves 0-33107A and 0-33108A and connecting piping to level switch 0-3341-71A within the scope of license renewal. The staff asked the applicant to identify where the LRA addresses the AMR for these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

(a) The applicant's response to RAI 2.3.2.5-4(a) stated that the diaphragm seals indicated on LR-DRE-M-28 and LR-DRE-M-359 are part of level transmitters LT-2-1341 and LT-3-1341, which are a filled-capillary type of differential pressure transmitter. This type of transmitter is used in applications where a constant reference leg level cannot be assured by process conditions (for example, condensation from a two-phase fluid). The transmitters are shipped with the diaphragm seals attached to the transmitter by coils of flexible tubing, with the fill fluid already installed. These transmitters are in the scope of license renewal but do not require aging management because they are active components.

(b) The applicant's response to RAI 2.3.2.5-4(b) stated that the loop seals are shown on LR-DRE-M-39 (A-9) and LR-DRE-M-369 (A-9). They are needed to provide a secondary containment boundary between the isolation condenser vent header, which discharges to the reactor building exterior, and the loop seal discharge to the reactor building. The loop seals are constructed of 1.5 in carbon steel piping and are included in LRA Table 2.3.2-5, with the component group of "piping and fittings (Dresden only)" and with a component intended function of "Pressure Boundary." The loop seals are not depicted correctly on the boundary diagrams. The boundary drawings should have highlighted the loop seals in green, with an "RBD/ISO" flag positioned after the highlighted portion.

The isolation condenser manways are part of the isolation condenser itself and are included in LRA Table 2.3.2-5, with the component group of "isolation condensers (Dresden only)" and with a component intended function of "pressure boundary." The manway bolting is included in LRA Table 2.3.2-5 with the component group of "closure bolting (Dresden only)" and with a component intended function of "pressure boundary."

(c) The applicant's response to RAI 2.3.2.5-4 (c) stated that the isolation valves for LS-0-3341-71A and the connecting piping are in scope, and should have been highlighted on LR-QDC-M-16-5. The valve equipment piece numbers on LR-QDC-M-16-5 are 0-3399-227A and 0-3399-228A. The connecting piping is identified on the drawing as 0-33107A-1" and 0-33108A-1." The valves are included in LRA Table 2.3.4-3 with the component group of "valves," and a component intended function of "pressure boundary." The connecting piping is included in Table 2.3.4-3 with the component group of "piping and fittings," and a component intended function of "pressure boundary."

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.5-4 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.5-4 resolved.

2.3.2.5.3 Conclusions

The staff reviewed LRA Section 2.3.2.5, the accompanying scoping boundary drawings and the applicant's response to RAIs dated October 3, 2003, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the isolation condenser system that are within the scope of license renewal, as required by 10 CFR 54.4, and that the applicant has adequately identified the components of the isolation condenser system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.6 Residual Heat Removal System—Quad Cities Only

2.3.2.6.1 Summary of Technical Information in the Application

The applicant described the residual heat removal (RHR) system components in LRA Section 2.3.2.6 and provided a list of components subject to an AMR in LRA Table 2.3.2-6.

The RHR system at Quad Cities has three modes of operation. The LPCI mode of RHR is the only ESF function of the system and operates to restore water level in the reactor vessel. The containment cooling mode furnishes spray to the drywell and suppression chamber to aid in reducing containment pressure following a LOCA. This mode also provides suppression chamber cooling to reduce water temperatures during operations that add heat to the suppression chamber and minimizes the amount of heat that the containment will need to accommodate during a LOCA. The shutdown cooling mode removes reactor residual and decay heat for shutdown, refueling, and servicing operations.

The RHR system consists of two loops, each loop containing two RHR pumps, one RHR heat exchanger (evaluated with the RHR service water system), and the necessary valves and piping to connect these components to the reactor vessel via the recirculation system piping, the suppression chamber for spray/cooling and the drywell for spray. The RHR system piping is maintained full by the ECCS keep fill system (evaluated with the CS system). Each loop of the system is equipped with a minimum flow bypass line to the suppression chamber for RHR pump protection. During normal plant operation, the RHR system is maintained in a lineup to be ready to inject water into either recirculation loop with all RHR pumps. Process lines that penetrate the primary containment structure contain isolation valves. The RHR room coolers are evaluated with the ECCS corner room HVAC system.

For the LPCI mode of operation, the primary source of water to the RHR system is supplied from the suppression chamber (evaluated with the primary containment structure). The backup source of water is the condensate storage tank (evaluated with the condensate and condensate storage system). For each loop, water is pumped from the suppression chamber, through the pumps to the heat exchanger (HX) and the HX bypass valve. Upon automatic initiation of the RHR system, the LPCI loop select logic will select the recirculation loop (evaluated with recirculation, recirculation flow control, and M/G sets system) that appears most likely intact and, provided reactor pressure is sufficiently low, will inject to the intact recirculation loop.

For the containment cooling mode of operation, there are three different uses.

(1) Drywell spray takes suction from the suppression chamber and pumps water to two spray nozzle headers in the drywell. These spray headers may be used during a LOCA to reduce drywell pressure.

(2) Suppression chamber spray takes suction from the suppression chamber and pumps water to spray nozzles in the suppression chamber. This reduces suppression chamber pressure following a LOCA.

(3) Suppression chamber cooling takes suction from the suppression chamber and pumps through an RHR heat exchanger (which rejects heat to the RHR service water system) and pumps the water back to the suppression chamber. This mode provides a heat sink, external to the containment, which will limit suppression chamber water temperature during conditions such as RCIC operation and minimize the amount of heat that the suppression chamber will need to accommodate during a LOCA (for pressure suppression and ECCS pump required suction head).

For the shutdown cooling mode of operation, the RHR pumps take suction from the "B" reactor recirculation system suction piping, pump water through an RHR heat exchanger (for heat removal via RHR service water system), and return the water to the reactor vessel via the recirculation system pump discharge line.

Intended functions within the scope of license renewal include the following:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary
- core cooling—provides emergency core cooling for various postulated LOCAs for a range of failure sizes from those for which the core is adequately cooled by HPCI up to and including the design-basis accident; in addition provides heat removal sufficient to achieve and maintain cold shutdown conditions during normal operation
- containment cooling—provides emergency containment cooling by recirculating suppression chamber water through the system heat exchangers and by spraying water into the drywell and the suppression chamber
- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment
- credited in regulated event(s)—provides containment cooling and decay heat removal credited in mitigation of the Appendix R fire and ATWS events; also contains components that are relied upon for compliance with 10 CFR 50.49 (EQ)
- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

Table 2.3.2-6 of the LRA identified the component groups requiring AMR. The component groups identified for RHR include the following:

- closure bolting (Quad Cities only)
- dampeners (Quad Cities only)
- dampeners (attached support, Quad Cities only)
- ECCS suction headers (Quad Cities only)
- filters/strainers (pressure boundary, Quad Cities only)
- filters/strainers (Filter, Quad Cities only)
- flow elements (Pressure Boundary, Quad Cities only)
- flow elements (Throttle, Quad Cities only)
- NSR vents or drains, piping, and valves (attached support, includes flow glasses, Quad Cities only)
- piping and fittings (Quad Cities only)
- piping and fittings (attached support, Quad Cities only)
- pumps (Quad Cities only)
- restricting orifices (includes dampeners, Quad Cities only)
- restricting orifices (Quad Cities only)
- sight glasses (attached support, Quad Cities only)
- spray Nozzles (Pressure Boundary, Quad Cities only)
- spray Nozzles (Spray, Quad Cities only)
- thermowells (Quad Cities only)
- tubing (Quad Cities only)
- tubing (attached support, Quad Cities only)
- valves (Quad Cities only)
- valves (attached support, Quad Cities only)

2.3.2.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.6 and Quad Cities UFSAR Sections 5.4.7, 6.3.1, and 6.3.2 to determine whether there is reasonable assurance that the components of the RHR system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the SCs that were identified as not being within the scope of license renewal to verify that (1) these SCs do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those SCs that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4 (a) that were not identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

2.3.2.6.3 Conclusions

The staff reviewed LRA Section 2.3.2.6 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the RHR system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the RHR system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.7 Low-Pressure Coolant Injection System—Dresden Only

2.3.2.7.1 Summary of Technical Information in the Application

The applicant described the LPCI system components in LRA Section 2.3.2.7 and provided a list of components subject to an AMR in LRA Table 2.3.2-7.

The LPCI system comprises two independent loops, each with two pumps and a heat exchanger that supply water to the reactor core via the reactor recirculation system. The LPCI system provides core cooling during a LOCA for break sizes ranging from those for which the core is adequately cooled by the HPCI system alone, up to and including a design-basis accident (DBA). The LPCI is capable of injecting large quantities of water into the reactor pressure vessel and provides core cooling by submerging the core in water. The LPCI system is also designed to supply cooling/spray water to the primary containment (drywell and suppression chamber) during accident conditions to maintain containment temperature and pressure below design limits. The LPCI system is also the normal means of removing water from the suppression chamber to maintain the water level in the normal band.

The LPCI system consists of two independent loops, each with two motor-driven pumps, an LPCI heat exchanger (evaluated with the containment cooling service water system (CCSW), associated piping, valves, and instrumentation. The normal water source is supplied from the suppression chamber via an ECCS suction header (evaluated with the primary containment structure). An alternate source of water to the LPCI pumps is supplied from the condensate storage tank (evaluated with the condensate and condensate storage system). The LPCI pumps can route water to several discharge paths. The LPCI system supplies water to the reactor vessel through the LPCI heat exchanger and into the reactor recirculation system (evaluated with the recirculation, recirculation flow control and MG set system) downstream of the reactor recirculation pumps. A motor-operated valve allows LPCI flow to bypass the heat exchanger. Each loop can deliver water to the reactor vessel through its own injection line or through the other LPCI loop injection line via a cross-tie line. Each LPCI loop is equipped with a test return line to the suppression chamber to permit functional testing and a minimum flow bypass line to the suppression chamber for pump protection.

Each LPCI loop also has the capability to deliver cooling/spray water to the primary containment during accident conditions. The containment cooling mode of operation consists of (1) drywell spray where LPCI pumps are aligned to pump water from the suppression chamber to headers equipped with spray nozzles in the drywell (evaluated with the primary containment structure) to reduce containment pressure following a LOCA, (2) suppression chamber spray where LPCI pumps are aligned to pump water from the suppression chamber to a header equipped with spray nozzles (evaluated with the primary containment structure) in the suppression chamber to reduce containment pressure following a LOCA, and (3) suppression chamber cooling where LPCI pumps are aligned to recirculate water from the suppression chamber, through the LPCI heat exchangers and back to the suppression chamber.

The LPCI system is also the normal means of removing water from the suppression chamber to maintain normal operational level band. Taking suction from the suppression chamber, the LPCI pumps can transfer water from the suppression chamber to the suppression chamber of the other unit, to the main condenser (evaluated separately) of either unit, or to the floor drain collector tank (evaluated with radwaste and equipment drains).

Intended functions within the scope of license renewal include the following:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary

- core cooling—provides emergency core cooling for various postulated LOCAs for a range of failure sizes from those for which the core is adequately cooled by HPCI up to and including the DBA

- containment cooling—provides emergency containment cooling by recirculating suppression chamber water through the system heat exchangers and by spraying water into the drywell and the suppression chamber

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment

- credited in regulated event(s)—provides containment cooling functions credited in mitigation of the Appendix R fire protection and ATWS events; also contains components that are relied upon for compliance with 10 CFR 50.49, (EQ)

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

Table 2.3.2-7 of the LRA identified the component groups requiring AMR. The component groups identified for LPCI include the following:

- closure bolting (Dresden only)
- ECCS suction headers (Dresden only)
- filters/drainers (Dresden only)
- flow elements (pressure boundary, Dresden only)
- flow elements (throttle, Dresden only)
- NSR vents or drains, piping, and valves (attached support, includes flow glasses, Dresden only)
- piping and fittings (Dresden only)
- piping and fittings (attached support, Dresden only)
- pumps (Dresden only)
- restricting orifices (pressure boundary, Dresden only)
- restricting Orifices (throttle, Dresden only)
- sight glasses (attached support, Dresden only)
- spray nozzles (pressure boundary, Dresden only)
- spray nozzles (spray, Dresden only)
- thermowells (Dresden only)
- tubing (Dresden only)
- tubing (attached support, Dresden only)
- valves (Dresden only)valves (attached support, Dresden only)

2.3.2.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.7 and Dresden UFSAR Sections 6.2.2, 6.3.1.2, and 6.3.2.2 to determine whether there is reasonable assurance that the components of the LPCI system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the SCs that were identified as not being within the scope of license renewal to verify that (1) these SCs do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those SCs that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that were not identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

After completing the initial review, the staff requested the applicant to provide additional information on the LPCI system. By letter dated October 3, 2003, the applicant responded to the staff's RAI as discussed below.

The LPCI coupling was identified in the BWRVIP-06 report as a safety-related component. It appears, however, that the component was not identified in the LRA as requiring an AMR. In RAI 2.3.2.7-1, the staff asked the applicant if the component exists at Dresden and/or Quad Cities. If so, the applicant was requested to justify its exclusion from aging management; otherwise, the applicant must submit an AMR for the subject component. In response, the applicant stated that the LPCI coupling identified in BWRVIP-06, BWR Vessel and Internals Project, applies to BWR/4, BWR/5, and BWR/6 reactors (Section 2.7, BWRVIP-06). The Dresden and Quad Cities reactors are BWR/3. The LPCI coupling identified in Section 2.7 of BWRVIP-06 does not exist at Dresden or at Quad Cities. Based on this discussion, the staff finds the applicant's assessment acceptable.

2.3.2.7.3 Conclusions

The staff reviewed LRA Section 2.3.2.7 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the LPCI system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the LPCI system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.8 Standby Liquid Control System

2.3.2.8.1 Summary of Technical Information in the Application

The applicant described the standby liquid control (SBLC) system components in LRA Section 2.3.2.8 and provided a list of components subject to an AMR in LRA Table 2.3.2-8.

The SBLC system is able to bring the reactor from full power to a cold, xenon-free subcritical condition, assuming that none of the withdrawn control rods can be inserted, by injecting sodium pentaborate solution into the reactor core.

The SBLC system consists of a tank for sodium pentaborate solution storage, two parallel suction lines from the tank with normally opened suction valves feeding a common pump suction header; two positive displacement pumps with normally opened suction valves that discharge into a common header; two explosion-actuated shear plug valves arranged in parallel discharge lines from the common discharge header; and other piping, valves, and instrumentation. The explosive valves are actuated to provide a flow path, and the sodium pentaborate solution is delivered to the reactor vessel (evaluated separately) by one or both of the positive displacement pumps. The pumps and piping are protected from overpressure by two relief valves which discharge back to the SBLC tank. Heaters are installed in the SBLC storage tank to ensure that the solution is maintained at sufficient temperature to keep the sodium pentaborate in solution. System piping normally filled with the sodium pentaborate solution is heat traced to ensure that the sodium pentaborate does not precipitate in the piping. The system also includes a test tank and associated piping used to measure pump performance.

Intended functions within the scope of license renewal include the following:

- reactivity control—provides the capability for bringing the reactor from full power to a cold, xenon-free shutdown assuming that none of the withdrawn control rods can be inserted
- pressure boundary—maintains the integrity of the reactor coolant pressure boundary.
- containment isolation—provides containment isolation for those portions of the system that interface with the primary containment
- credited in regulated event(s)—provides reactivity control credited in mitigation of the ATWS event
- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

Table 2.3.2-8 of the LRA identified the component groups requiring AMR. The component groups identified for SBLC include the following:

- accumulators
- closure bolting
- dampeners (Quad Cities only)
- NSR vents or drains, piping, and valves (attached support)
- piping and fittings
- piping and fittings (attached support)
- pumps
- sight glasses
- tanks
- thermowells
- tubing

- tubing (attached support)
- valves
- valves (attached support)

2.3.2.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.8, Dresden UFSAR Section 9.3.5, and Quad Cities UFSAR Sections 9.3.5 to determine whether there is reasonable assurance that the components of the SBLC system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the structures and components that were identified as not being within the scope of license renewal to verify that (1) these SCs do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those SCs that have applicable intended function(s), they either perform this function(s) with moving parts or a change in configuration or properties, or they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that were not identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

2.3.2.8.3 Conclusions

The staff reviewed LRA Section 2.3.2.8 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the SBLC system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SBLC system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.9 Standby Gas Treatment System

2.3.2.9.1 Summary of Technical Information in the Application

The applicant described the standby gas treatment system (SBGTS) in LRA Section 2.3.2.9 and provided a list of components subject to an AMR in LRA Table 2.3.2-9.

The SBGTS, which is designed to maintain a small negative pressure in the reactor building relative to the atmosphere outside of the building, has the functions of processing and controlling the effluent releases from the primary containment (drywell and suppression chambers) during vent and purge operation when necessary; processing radioactive effluent from the HPCI gland seal exhaust subsystem (Dresden only) during HPCI operation; and processing and controlling the intentional exhaust of radioactive material from the reactor building spaces to the environment during a DBA. These ensure that the requirements of 10 CFR 100 are met.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following SBGTS intended functions:

- filtration—filters and removes radioactive gases and particulates that are present in the secondary containment prior to discharging to the environment after a DBA

- containment—maintains a small negative pressure in the reactor building under isolation conditions

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity for non-safety-related components that could be a hazard to safety-related SSCs, so that the intended function of safety-related SSCs is not adversely affected

- credited in regulated events—contains components that are relied upon for compliance with 10 CFR 50.49 (EQ)

The SBGTS consists of two 100 percent capacity treatment trains. During normal operation, one train is selected as the primary and the other is placed in standby. The SBGTS receives effluent from three sources—the reactor building, primary containment, and an HPCI gland exhauster. Each train (which consists of piping that routes effluent flow to a demister, an electrical heater, roughing pre-filter, high-efficiency filters, charcoal absorbers, high-efficiency after filter, fan, associated valves, and instrumentation) filters and removes radioactive particles and adsorbs radioactive halogens (noble gases not included). Each SBGTS train is capable of maintaining a small negative pressure in the reactor building under isolation conditions to prevent ground-level escape of airborne activity. Exhaust from each SBGTS train is routed through piping to the reactor building ventilation chimney. Process moisture removed by the demister is drained to the reactor building equipment drain tank. Both SBGTS trains are connected by a cross-tie line containing a restricting orifice and isolation damper. During operation, the primary train provides cooling flow to the standby train through the cross-tie line with air from the reactor building atmosphere at Dresden and from the turbine building at Quad Cities. The primary SBGTS train fan provides the motive force for both the treated flow through the primary train and the cooling flow through the standby train.

In LRA Section 2.3.2.9, the applicant described the evaluation boundary of the SBGTS. In addition, the applicant highlighted those portions of the SBGTS and its structures and components that are within the scope of the Rule in the P&IDs listed as references in LRA Section 2.3.2.9. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the SBGTS system in LRA Table 2.3.2-9 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- ducts—including piping and fittings (pressure boundary)
- doors, closure, closure bolts, equipment frames—including inlet bells, restricting orifices, and tubing (pressure boundary)
- doors, closure, closure bolts, equipment frames—including restricting orifices and exhaust header (throttle)
- fan housings (pressure boundary)
- filters/strainers—including demisters (Dresden only, pressure boundary)
- flex collars, doors, and damper seals (pressure boundary)
- housings and supports including filters (pressure boundary)
- manifolds (pressure boundary)
- NSR vents or drains, piping, and valves—including tubing (structural integrity/attached support)
- seals (pressure boundary)
- tubing (structural integrity/attached)
- tubing (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached)

2.3.2.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.9, Dresden UFSAR Section 6.5.3, and Quad Cities UFSAR Section 6.5.3 to determine whether there is reasonable assurance that the SBGTS components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the SBGTS in the LRA. The staff did not identify any omissions. Also, the staff selected system functions described in the UFSARs that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the SBGTS that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&IDs to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&IDs were representative of the SBGTS. The staff then reviewed the referenced P&IDs to verify that those portions of the SBGTS that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.2.9 and that the applicant identified all SBGTS components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.2.9 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the letter of August 4, 2003, the staff issued RAIs to the applicant concerning the specific items needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter dated October 3, 2003, are described below.

RAI 2.3.2.9-1. Ventilation damper housings are highlighted on the ventilation flow diagrams identified in the LRA as within the scope of license renewal. While ventilation damper housings are highlighted as within the scope of license renewal, ventilation damper housings are not identified in the application tables that identify component groups requiring AMR. Examples of ventilation damper housings not identified in the component groups requiring AMR application tables include the following:

- standby gas treatment system, Table 2.3.2-9
- standby blackout building HVAC, Table 2.3.3-10
- reactor building HVAC, Table 2.3.3-8 (Quad Cities HVAC butterfly isolation valve housings)

The staff asked the applicant to state whether these components are within the scope of license renewal and subject to an AMR. If they are, the staff asked the applicant to provide the relevant information about the components so that the staff can complete the component groups requiring AMR tables of the LRA. If the components are not in scope or subject to an AMR, the applicant must provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.9-1 stated that the ventilation damper housings highlighted on boundary diagrams LR-DRE-M-49 and LR-QDC-M-44 for the SBGTS are within the scope of license renewal and subject to an AMR. These ventilation dampers are included under the component group "valves" found in LRA Table 2.3.2-9.

The ventilation damper housings highlighted on boundary diagrams LR-DRE-M-4356-1, 2, 3, 4, and 5, and LR-QDC-M-3033-1, and 2 for the station blackout building HVAC system are within the scope of license renewal and subject to an AMR. These ventilation dampers were evaluated with the component group "doors, closure bolts, equip frames" found in LRA Table 2.3.3-10.

The Quad Cities HVAC butterfly isolation valves highlighted on boundary diagrams LR-QDC-371 and LR-QDC-M-371-1 for the reactor building HVAC system are within the scope of license renewal and subject to an AMR. These ventilation dampers were evaluated with the component group "doors, closure bolts, equip frames" in LRA Table 2.3.3-8.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.9-1 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.9-1 resolved.

<u>RAI 2.3.2.9-2</u>. The following passive components associated with ventilation system ductwork are not identified as within the scope of license renewal or subject to an AMP:

- ductwork turning vanes
- ventilation system elastomer seals
- ventilation equipment vibration isolator flexible connections
- ductwork test connections
- ductwork access doors

The staff asked the applicant to state whether it agrees that these components are within the scope of license renewal and subject to an AMR. If they are, the applicant must provide the information necessary to complete the AMR result tables. If these components are not in scope and subject to an AMR, the applicant must provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.9-2 stated that ductwork turning vanes and the ductwork access doors were evaluated as part of the ductwork. The ductwork is included within the scope of license renewal and is subject to an AMR. The ductwork is included on LRA Tables 2.3.3.7, 2.3.3.8, and 2.3.3.10 and is evaluated under the component group "Doors, closure bolts, equip frames."

Ventilation system elastomer seals and ventilation equipment vibration isolator flexible connections are included within the scope of license renewal and are subject to an AMR. The seals and flexible connections are included on LRA Tables 2.3.3.7, 2.3.3.8, and 2.3.3.10 and are evaluated under the component group, "flex collars, doors, duct and damper Seals."

Ductwork test connections are within the scope of license renewal and are subject to an AMR. The test connections are included on LRA Tables 2.3.3.7, 2.3.3.8, and 2.3.3.10 under the component group, "duct fittings, hinges, latches."

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.9-2 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.9-2 resolved.

RAI 2.3.2.9-3. The staff asked the applicant to clarify whether structural sealants used to maintain the power block building pressure boundary envelope (i.e., main control room, auxiliary building, fuel handling building, reactor building) at design pressure with respect to the adjacent areas are included in the scope of license renewal and subject to an AMR. The staff asked for information relating to structural sealant use as referenced in Table 2.1-3 on page 2.1-15 of NUREG-1800. According to NUREG-1800, an applicant's structural AMP is expected to address structural sealants with respect to an AMR program. If structural sealants are not in the scope of license renewal and subject to an AMR, the applicant must provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.2.9-3, the applicant stated that structural sealants used to maintain the power block building pressure boundary envelope are included in the scope of license renewal and subject to an AMR.

The following structures have caulking and sealant within the scope of license renewal and are subject to an AMR:

- Reactor buildings roof joints and blowout panel seals are included in LRA Table 2.4-2 under the component group, "caulking/sealants."

- Contaminated condensate storage tanks foundations tank seals are included in LRA Table 2.4-10 under the component group "caulking/sealants."

- Exhaust duct penetration sealant located in the station blackout battery room (Dresden only) and the station blackout day tank rooms (Quad Cities only) is included in LRA Table 2.4-6 under the component group "caulking/sealants."

- Station chimney sealant at manhole elevation 561' at Dresden and sealant at manhole elevation 638'-6" at Quad Cities are included in LRA Table 2.4-13 under the component group "caulking/sealants."

- 2/3 isolation condenser pump house (Dresden only) roof flashing to reactor building interface is included in LRA Table 2.4-7 under the component group "caulking/sealants."

- Turbine building caulking/sealant is included in LRA Table 2.4-4 under the component group, "caulking/sealants."

- Control room (both stations) and auxiliary electrical equipment room (Dresden only) penetration seal caulking/sealant is included in LRA Table 2.4-3 under the component group "penetration seals."

A new component group "caulking/sealants," should have been included in LRA Table 2.4-3 with a component intended function of structural pressure barrier.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.9-3 acceptable because the applicant identified structures' caulking and sealant as within the scope of license renewal and subject to an AMR in accordance with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.9-3 resolved.

RAI 2.3.2.9-4. The applicant did not describe its process of evaluating consumables in the LRA. The staff asked the applicant to state whether its evaluation process for consumables is subject to screening guidance in accordance with Table 2.1-3 of NUREG-1800. If consumables are not considered subject to NUREG-1800 scoping and screening guidance, the applicant should provide a justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.2.9-4 states that Exelon concurs that the process of evaluating consumables was not described in the LRA. However, the Exelon process for evaluating consumables was consistent with the screening guidance provided in Table 2.1-3 of NUREG-1800 and the NRC memo to NEI, Mr. C.I. Grimes to Mr. D.J. Walters, License Renewal Issue No. 98-12, "Consumables," dated March 10, 2000. The following describes Exelon's process for evaluating consumables.

Group (a) subcomponents (packing, gaskets, component seals, and O-rings) of pressure boundary components were not listed explicitly in scoping and screening. The pressure boundary components that include packing, gaskets, seals, and O-rings as subcomponents have been designed to industry codes and standards, such as ANSI B31.1 or ASME Code, Section III, and do not rely on such subcomponents to maintain the structural integrity of the pressure boundary. The Dresden and Quad Cities specifications that implement the codes and standards applicable to piping and piping components do not list these as pressure boundary components, and these components are not credited with maintaining the pressure boundary function.

Group (b) subcomponents (structural sealants) were not called out explicitly in scoping and screening. The AMRs for structures determined whether structural sealants were credited with an intended function and, where applicable, included them in an appropriate AMP.

Group (c) consumables (oil, grease, and component filters) were not listed in scoping and screening and are not subject to AMR because they are periodically replaced.

Group (d) consumables (system filters, fire extinguishers, fire hoses and air packs) were not listed in scoping and screening because these items are replaced on condition. System filters are replaced based on manufacturers' requirements. Fire extinguishers, fire hoses and air packs are periodically inspected or tested consistent with instructions that implement applicable National Fire Protection Association (NFPA) guidelines as documented in the fire hazards analysis for each station.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.2.9-4 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.2.9-4 resolved.

2.3.2.9.3 Conclusions

The staff reviewed LRA Section 2.3.2.9, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the SBGTS that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the SBGTS that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.10 Automatic Depressurization System

2.3.2.10.1 Summary of Technical Information in the Application

The applicant described the automatic depressurization system (ADS) in LRA Section 2.3.2.10. The applicant did not provide a list of components subject to AMR. However, under the title, "Table 2.3.2-10," in LRA Section 2.3.2.10, the applicant stated that Dresden and Quad Cities design-basis documents treat the ADS relief valves and associated piping, solenoids, pressure controllers, and position switches as components of the main steam system. These mechanical components of the ADS subject to an AMR are included as components of the main steam system in this LRA.

The ADS, which is a safety-related system, has the function of providing backup for the HPCI system and performing vessel depressurization for all "small breaks" inside the primary containment or "small unisolable breaks" outside the containment. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following ADS intended functions:

- core cooling—provides core cooling by receiving process signal inputs and providing, through appropriate relay logic, actuation signal outputs to relieve valves assigned to the main steam system (opening of the relief valves actuated by the ADS depressurizes the reactor vessel to support LPCI and low-pressure core spray operation)
- credited in regulated event(s)—provides emergency core cooling credited in mitigation of the Appendix R fire protection and SBO events

The ADS is one of the ECCSs designed to operate with the LPCI and CS to protect reactor vessel/fuel in situations where the vessel is losing coolant. At Quad Cities, LPCI is an operational mode of the RHR system. For small breaks, the vessel is depressurized in sufficient time to allow the CS or LPCI to provide adequate core cooling. For large breaks, the vessel depressurizes through the break without assistance. The ADS evaluation boundary comprises the logic relays, timers, and instrumentation that receives process signal input and provides actuation signals to the relief valves actuated by the ADS. The ADS uses five safety/relief valves, which are part of the main steam system, to carry out its function. The safety/relieve valves and their tail pipes, and vacuum breaker valves, related solenoids, pressure controllers, position switches, and pneumatic air components associated with the safety/relief valves are evaluated with the main steam system in LRA Section 2.3.4.1. The suppression chamber and T-quenchers, through which steam is discharged into the suppression pool during ADS operation, are both evaluated with the primary containment structure in LRA Section 2.4.1.

2.3.2.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.10, Dresden UFSAR Sections 6.3.1 and 6.3.2, and Quad Cities UFSAR Sections 6.3.1 and 6.3.2 to determine whether there is reasonable assurance that the components of the ADS within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified as an ADS intended function in the LRA. The staff did not identify any omissions

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that the components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

As discussed above under the title "Table 2.3.2-10" in LRA Section 2.3.2.10, the applicant stated that the mechanical components of the ADS subject to an AMR are included as components of the main steam system in the LRA. The staff reviewed LRA Section 2.3.4.1 to verify that the scoping and screening section for the main steam system included all the mechanical components that support the ADS operation. The staff found all the mechanical components that support the ADS operation included with the main steam system with the exception of the T-quenchers, which the licensee stated in LRA Section 2.3.2.10 were evaluated with the primary containment. The staff's evaluation of the primary containment is provided in Section 2.4.1 of this SER.

2.3.2.10.3 Conclusions

The staff reviewed LRA Section 2.3.2.10 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the ADS that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the ADS that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.11 Anticipated Transient Without Scram System

The applicant noted that the ATWS system is not classified in the Dresden or Quad Cities UFSAR as an ESF. However, the ATWS system is evaluated in this section because of similarities with other systems that are characterized as ESF systems.

2.3.2.11.1 Summary of Technical Information in the Application

The applicant described the ATWS system components in LRA Section 2.3.2.11 and provided a list of components subject to an AMR in LRA Table 2.3.2-11.

The ATWS system provides the instrumentation and logic necessary for control rod insertion and recirculation pump trips to mitigate the effects of an ATWS situation.

ATWS events are beyond design-basis accidents. They are low-probability events in which an anticipated transient occurs and is not followed by an automatic reactor shutdown (scram) when required. The failure of the reactor to scram quickly during these transients can lead to unacceptable reactor coolant system pressures and to fuel damage. The ATWS system logic, when energized, will reposition alternate rod insertion (ARI) solenoid valves to depressurize the scram air header for control rod insertion and, in the event of an automatic initiation, trip the recirculation pump motor generator field breakers. The ATWS system is divided into two separate systems. The trip logic circuitry of each ATWS system division is capable of performing the required mitigating action (tripping both recirculation pump motor generator field breakers and actuating three of the six ARI valves). The ATWS system will automatically initiate upon signals of high reactor pressure or low-low reactor water level. The ATWS system can also be initiated manually.

Intended functions within the scope of license renewal include the following:

- reactivity control—provides an alternate means of control rod insertion and trips reactor recirculation pump M-G set field breakers

- credited in regulated event(s)—provides reactivity control credited in mitigation of ATWS events

Table 2.3.2-11 of the LRA identified the component groups requiring AMR. The component groups identified for ATWS include:

- closure bolting
- piping and fittings
- valves

2.3.2.11.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.11, Dresden UFSAR Section 7.8 and Quad Cities UFSAR Section 7.8 to determine whether there is reasonable assurance that the components of the ATWS system within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the SRP for License Renewal (NUREG-1800) and is described below.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted. As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and

10 CFR 54.21(a)(1). The staff reviewed the relevant portions of the UFSAR for the reactor vessel and associated components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed the SCs that were identified as not being within the scope of license renewal to verify that (1) these SCs do not have any of the intended functions delineated under 10 CFR 54.4(a), and (2) for those SCs that have an applicable intended function(s), verify that they either perform this function(s) with moving parts or a change in configuration or properties, or that they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1).

The staff also reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that were not identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed so that the functions will be maintained consistent with the CLB for the extended period of operation.

2.3.2.11.3 Conclusions

The staff reviewed LRA Section 2.3.2.11 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes the applicant has adequately identified the components of the ATWS system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the ATWS system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.12 Evaluation Findings

On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the engineered safety features systems and components that are within the scope of license renewal, in accordance with the requirements of 10 CFR 54.4(a), and that the applicant has adequately identified the engineered safety features that are subject to an AMR, in accordance with the requirements of 10 CFR 54.21 (a)(1).

2.3.2.13 References

1. Letter from Patrick R. Simpson (Exelon) to the NRC, "Additional Information for the Review of the License Renewal Applications for Quad Cities Nuclear Power Station, Units 1 and 2 and Dresden Nuclear Power Station, Units 2 and 3," October 3, 2003.

2.3.3 Auxiliary Systems

2.3.3.1 Refueling Equipment

2.3.3.1.1 Summary of Technical Information in the Application

The applicant described the refueling equipment system in LRA Section 2.3.3.1 and provided a list of components subject to an AMR in LRA Table 2.3.3-1.

The purpose of the fuel handling system is to receive and transfer nuclear fuel in a manner that precludes the occurrence of inadvertent criticality and to provide equipment for handling both new and irradiated fuel. To achieve this purpose the fuel handling equipment is designed to handle fuel assemblies and other reactor components. Using the methodology described in LRA Section 2.1.4.1 for identifying mechanical components within the scope of license renewal, the applicant identified the following intended refueling equipment functions:

- Maintain structural integrity to prevent collapse of the platform onto the spent fuel storage racks or the reactor core.

- Preclude occurring of inadvertent criticality by providing interlocks for the movement of cranes.

In LRA Section 2.3.3.1, the applicant described the evaluation boundary of the refueling equipment system. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the refueling equipment system in LRA Table 2.3.3-1 as being within the scope of license renewal and subject to an AMR at Dresden:

- cranes (structural support)
- fuel grapples (structural support)
- fuel pool gates (pressure boundary)
- fuel preparation machines (structural support)

2.3.3.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.1, Dresden UFSAR Section 9.1.4, and Quad Cities UFSAR Section 9.1.4 to determine whether there is reasonable assurance that the refueling equipment system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the refueling equipment system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

The staff's review of LRA Section 2.3.3.1 identified areas in which additional information was necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003 letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's scoping RAI and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.1-1. The applicant included the reactor building overhead crane in the component group "cranes" requiring an AMR as listed in LRA Table 2.3.3-1. LRA Table 3.3.1 lists the component group cranes as cranes including bridge and trolleys and rail system in load handling system that require an AMR for loss of material due to general corrosion and wear (AMR Ref. No. 3.3.1.14). The staff was unable to identify the components consisting of the group cranes in order to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to identify the specific components of cranes, which are within the scope of license renewal and subject to an AMR.

Applicant's Response and Staff's Evaluation

In response to RAI 2.3.3.1-1, the applicant stated under its response to RAI 2.4-9 that while the type of components comprising crane subsystems can vary, the following cranes component types require aging management—load carrying flanges; support structures; bolts, nuts, or rivets; load blocks; suspension housings; hand chain wheels; chain attachments; clevis; yokes; suspension bolts; shafts; gears; bearings; pins; rollers; lock and clamping devices; hook retaining nuts; hook retaining collars/pins; retaining member welds; load sprockets; drums; sheaves; hydraulic subsystems; cable; cable clamps; brakes; and bridge/beam structures.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.1-1 acceptable because it provided a list of the components subject to an AMR in accordance with the criteria set forth in 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.1-1 resolved.

RAI 2.3.3.1-2. The LRA Section 2.3.3.1 states that the major component of the refueling equipment system includes the refueling platform assembly which consists of refueling platform, fuel grapple, and associated equipment. The staff was unable to identify the components the applicant referred to as "associated equipment in order to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to list components referred to as the "associated equipment," and specify which components (if any) are within the scope of license renewal and subject to an AMR.

Applicant's Response and Staff's Evaluation

In response to RAI 2.3.3.1-2, the applicant identified the following components as "associated equipment":

> The refueling platform bridge includes a walkway, railings and a trolley mounted control cab, a main grapple hoist, the adjacent frame mounted auxiliary hoist, a reverse mounted monorail auxiliary hoist, a hinged jib arm power winch, and the reels, drives, pulleys, and sheaves required for the hoist cables and the service air lines from the self contained, refueling platform mounted air compressor. The bridge air system includes the compressor, air receiver, shutoff valves, solenoid valves, air hose retrieval assist drives, and quick disconnect fittings.

The applicant also stated that all of the above-listed components are in the scope of license renewal and subject to an AMR.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.1-2 acceptable because it provided a list of the components subject to an AMR in accordance with the criteria set forth in 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.1-2 resolved.

RAI 2.3.3.1-3. The LRA Section 2.3.3.1 states that the inboard main steamline plugs, vents, and regulators associated with the reactor vessel system are evaluated with the refueling equipment system. The applicant did not provide the results of this evaluation and the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to clarify whether any of the above components are within the scope of license renewal and subject to an AMR.

Applicant's Response and Staff's Evaluation

In response to RAI 2.3.3.1-3, the applicant stated that the inboard main steamline plugs, vents, and regulators referenced in LRA Section 2.3.3.1 are temporary pieces of equipment (line plugs) installed to facilitate refueling operations. This equipment is not within the scope of license renewal and, therefore, not subject to an AMR.

Because the applicant stated that the subject components are temporary pieces of equipment installed to facilitate refueling operations, the staff agrees that they are not subject to an AMR since they are periodically replaced. Therefore, the staff finds the applicant's response to RAI 2.3.3.1-3 acceptable and considers its concern described in RAI 2.3.3.1-3 resolved.

2.3.3.1.3 Conclusions

The staff reviewed LRA Section 2.3.3.1, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the refueling equipment system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the refueling equipment system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.2 Shutdown Cooling System (Dresden only)

2.3.3.2.1 Summary of Technical Information in the Application

The applicant described the shutdown cooling system (SDCS) in LRA Section 2.3.3.2 and provided a list of components subject to an AMR in LRA Table 2.3.3-2.

The function of SDCS at Dresden Station is to provide cooling of the reactor water when the temperature and pressure in the reactor fall below the point at which the main condenser can no longer be used as a heat sink following reactor shutdown. The system can also be used to help cool the fuel pool during refueling outages and to heat reactor water with steam from the plant heating system during startup from cold shutdown.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following SDCS intended functions:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary
- provides containment isolation—for those portions of the system that interface with the primary containment
- core cooling—provides heat removal sufficient to achieve and maintain cold shutdown conditions during normal operation
- credited in regulated events—provides heat removal sufficient to achieve and maintain cold shutdown conditions during normal operation (This core cooling function is credited in mitigation of the Appendix R fire event. The system contains components that are relied upon for compliance with 10 CFR 50.49 (Equipment Qualification)).
- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The SDCS consists of three partial capacity cooling loops, each containing a pump, a heat exchanger, and associated piping, valves and instrumentation. The system takes suction from either reactor recirculation loop, delivers the flow through each of the three separate cooling loops, and then directs it to the LPCI injection lines. Capability also exists to permit flow from both reactor recirculation loops to both LPCI injection lines simultaneously. When used to augment fuel pool cooling, only one of the cooling loops is required. Each cooling loop is provided with a minimum flow valve to return pump discharge flow to the pump suction. The system heat exchangers are cooled by water from the reactor building closed cooling water (RBCCW) system in the cooling mode and heated by steam from the plant heating system in the heating mode. Provision is also made for chemical sampling, cleanup via the reactor water cleanup system, and system drainage to the reactor building equipment drain system. The SDCS is also used to help cool the fuel pool during refueling outages and to heat reactor water with steam from the heating boiler during startup from cold shutdown.

In LRA Section 2.3.3.2, the applicant described the evaluation boundary of the SDCS. In addition, the applicant highlighted those portions of the SDCS and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.2. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the SDCS in LRA Table 2.3.3-2 as being within the scope of license renewal and subject to an AMR at Dresden:

- closure bolting (pressure boundary)
- dampeners (pressure boundary)
- filters/strainers (pressure boundary)
- filters/strainers (filter)
- heat exchangers (pressure boundary)
- heat exchangers (heat transfer)
- NSR vents or drains, piping, and valves (structural integrity/attached support)
- piping and fittings (pressure boundary)
- pumps (pressure boundary)
- restricting orifices (pressure boundary)
- restricting orifices (throttle)

- sight glasses (pressure boundary)
- sight glasses (structural integrity/attached support)
- thermowells (pressure boundary)
- valves (pressure boundary)

2.3.3.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.2 and Dresden UFSAR Section 5.4.7, as well as other UFSAR Sections that discussed the SDCS, which included Sections 1.2.2, 1.9.2, 3.1.2, 3.2.9, 3.3.2, 3.6.2, 3.8.5, 3.9.2, 5.1, 5.2.2, 5.4.1, 5.4.7, 6.2, 6.3.1, 7.1.3, 7.3.2, 7.4.2, 9.1.2, 9.1.3, 9.2.3, 9.3.2, 12.3.2, 12A.2, 12A.4, 14.2.4, and 15.6.4, to determine whether there is reasonable assurance that the SDCS components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with the Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the SDCS system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the SDCS that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the SDCS. The staff then reviewed the referenced P&I drawings to verify that those portions of the SDCS that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.2; and that the applicant identified all SDCS components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.2 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

<u>RAI 2.3.3.2-1</u>. License renewal boundary drawing LR-DRE-M-32, "Shutdown Reactor Cooling Piping," (at A-7) shows a 0.5 in. pipe that is in scope (colored green) that goes from the SDCS pump 2-1002A seal cooler, to drawing LR-DRE-M-39, "Reactor Building Equipment Drains" (at A-8), where it ties into a pipe that goes from valve 2-1001-213A to the same SDCS pump shown on drawing LR-DRE-M-39. However, on drawing LR-DRE-M-39 the pipe is not shown in scope (not color coded). The staff believes that the run of pipe shown on drawing

LR-DRE-M-39 that comes from drawing LR-DRE-M-32, and the pipe it tees into, up to and including valve 2-1001-213A and the SDCS pump, should be in scope for the same reason the portion of that pipe on drawing LR-DRE-M-32 is in scope. This also applies to pumps 2-1002B and C on drawings LR-DRE-M-32 and -39, as well as to pumps 3-1002A, B and C on drawings LR-DRE-M-363 and 369. Please provide a justification for the exclusion of the portion of the piping shown on drawings LR-DRE-M-39 and LR-DRE-M-369.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.2-1 is that boundary diagrams LR-DRE-M-32, LR-DRE-M-39, LR-DRE-M-363, and LR-DRE-M-369 should have highlighted the piping from the seal coolers to the shutdown cooling pumps, up to and including pumps 2(3)-1002A, B, and C and valves 2(3)-1001-213A, B, and C. Valves 2(3)-1001-213A, B, and C are included in LRA Table 2.3.3-2, under component group "valves (Dresden only.)." The Aging Management Reference for the internal environment is 3.3.1.8. The Aging Management Reference for the external environment is 3.3.2.27. Pumps 2(3)-1002A, B, and C are included in Table 2.3.3-2, under component group "pumps (Dresden only.)." The Aging Management Reference for the internal environment is 3.3.1.8. The Aging Management Reference for the external environment is 3.3.1.5.

Based on its review of the applicant's clarification discussed above, the staff concurs with the applicant's clarification that the above-cited segments of piping and their associated components are within the scope of the Rule, and they were inadvertently not highlighted in the LR boundary diagrams. Also, because the components associated with the cited segments of piping are included in LRA Table 2.3.3-2 subject to an AMR, the staff finds the applicant's response to RAI 2.3.3.2-1 acceptable. Therefore, the staff considers its concern described in RAI 2.3.3.2-1 resolved.

RAI 2.3.3.2-2. License renewal boundary drawing LR-DRE-M-32, "Shutdown Reactor Cooling Piping," (at C-9) shows relief valve RV 2-1099-29, and the associated piping to the header, in scope (colored Green). However, the equivalent relief valve, RV 3-1099-29, on LR-DRE-M-363, "Shutdown Reactor Cooling Piping," (at C-9) is shown not in scope (not color coded). The staff believes that RV 3-1099-29 on LR-DRE-M-363 should be in scope for the same reason that RV 2-1099-29 on LR-DRE-M-32 is in scope. The relief valve provides a passive intended function. Please provide a justification for the exclusion of RV 3-1099-29 on LR-DRE-M-363 and the associated piping to the main header.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.2-2 is that boundary diagram LR-DRE-M-363 should have highlighted valve 3-1099-29 and the associated piping to the main header. However, Dresden Station has plans to remove these valves from the plant design. Since the LRA was prepared, a modification was completed under engineering change (EC) 338910 that removed relief valve 3-1099-29 and replaced it with a blind flange. EC 340263, to remove relief valve 2-1099-29 from Dresden Unit 2, has not yet been implemented.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.2-2 acceptable because the subject valve will be removed and replaced with a blind flange. Therefore, the staff considers its concern described in RAI 2.3.3.2-2 resolved.

2.3.3.2.3 Conclusions

The staff reviewed LRA Section 2.3.3.2, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the SDCS that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SDCS that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.3 Control Rod Drive Hydraulic System

2.3.3.3.1 Summary of Technical Information in the Application

The applicant described the control rod drive hydraulic (CRDH) system in LRA Section 2.3.3.3 and provided a list of components subject to an AMR in LRA Table 2.3.3-3.

The purpose of the CRDH system is to (1) control changes in reactivity by incrementally positioning the control rods in response to signals from the reactor manual control system, and (2) shut down the reactor quickly by rapidly inserting control rods into the core in response to manual or automatic signal. The CRDH system is made up of supply pumps, filters, strainers, control valves, and associated instrumentation and controllers. The CRDH system provides water at the required pressures to the hydraulic control units for cooling and all types of required control rod motion. The CRDH system allows control rod withdrawal or insertion at a limited rate, one rod at a time, for power level control and flux shaping during reactor operation.

Using the methodology described in LRA Section 2.1.4.1 for identifying mechanical components within the scope of license renewal, the applicant identified the following intended CRDH system functions:

- Provide reactivity control to rapidly shut down (scram) the reactor under appropriate conditions.

- Provide pressure boundary to support integrity of the reactor coolant pressure boundary and to support in-scope pressure boundaries at interfaces with other in-scope systems.

- Provide (1) scram discharge volume vent and drain isolation valves which are credited to remain closed in the 10 CFR 50, Appendix R fire event, and (2) alternate rod insertion capability which is credited in the ATWS event. At Dresden only, CRDH system water supply to the vessel is credited in the 10 CFR 50, Appendix R fire event. Also at Dresden only, CRDH system contains components that are relied upon for compliance with 10 CFR 50.49, environmental qualification of electric equipment important to safety for nuclear power plants.

- Preclude occurring of adverse effects on safety-related SSCs by maintaining sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected.

In LRA Section 2.3.3.3, the applicant described the evaluation boundary of the CRDH system. In addition, the applicant highlighted those portions of the CRDH system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.3. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified component groups and their intended functions within the CRDH system in LRA Table 2.3.3-3 as being within the scope of license renewal and subject to an AMR.

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1 and clarified in a letter, dated June 22, 2004, the applicant expanded the system boundaries for the CRDH system at both Dresden and Quad Cities due to the potential for spatial interaction with safety-related components. The applicant added all of the CRDH components shown on revised boundary diagrams LR-DRE-M-34-1, LR-DRE-M-365-1, LR-DRE-M-419-4, LR-QDC-M-41-4, and LR-QDC-M-83-4 to the scope of license renewal. The applicant excluded the isolated vent and drain piping the CRDH system from the scope of license renewal because the piping does not contain any fluid that could spatially interact with safety-related equipment in the general area. These changes resulted in adding four component groups to LRA Table 2.3.3-3.

The following is the component groups and their intended functions within the CRDH system in the revised LRA Table 2.3.3-3 as being within the scope of license renewal and subject to an AMR:

- accumulators (pressure boundary)
- closure bolting (pressure boundary)
- dampeners (pressure boundary, Quad Cities only)
- dampeners (spatial interaction, Quad Cities only)
- filters/strainers (pressure boundary)
- filters/strainers (filter)
- filters/strainers (spatial interaction) (leakage boundary (spatial), Quad Cities only)
- flow elements (spatial interaction)
- flow elements (pressure boundary, Dresden only)
- NSR vents or drains, piping, and valves (attached support)
- piping and fittings, including dampeners and tubing (pressure boundary)
- piping and fittings (spatial interaction)
- piping and fittings (attached support)
- pumps (pressure boundary) (Dresden only)
- pumps (spatial interaction) (leakage boundary (spatial), Quad Cities only)
- restricting orifices (pressure boundary, Dresden only)
- restricting orifices (spatial interaction) (leakage boundary (spatial), Quad Cities only)
- rupture discs (pressure boundary)
- tanks, including accumulators (pressure boundary)
- tubing (pressure boundary)
- tubing (spatial interaction) (leakage boundary (spatial), Quad Cities only)
- valves (pressure boundary)
- valves (spatial interaction)
- valves (attached support)

2.3.3.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.3, Dresden UFSAR Section 4.6.3, and Quad Cities UFSAR Section 4.6.3 to determine whether there is reasonable assurance that the CRDH system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the CRDH system in the LRA.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the CRDH that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the CRDH. The staff then reviewed the referenced P&I drawings to verify that those portions of the CRDH that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.3; and that the applicant identified all CRDH components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.3 identified areas in which additional information was necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the letter dated August 4, 2003, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, and supplemented by letter, dated December 17, 2003, are described below.

RAI 2.3.3.3-1. License renewal boundary diagram LR-QDC-M-41-1 for Quad Cities Unit 1 excludes the following sections of piping from the scope of license renewal, while piping at both ends of these sections is identified as in scope:

- 1-0314A-1/2"-A (section from locations A-7 to E-9)
- 1-0314B-1/2"-A (section from locations A-4 to E-2)
- 1-0314-2"-A (section from locations A-5 to A-6)
- 1-0313-1"-C (section from locations B-5 to B-6)
- 1-0315-1"-A (section from locations B-5 to B-6)

License renewal boundary diagram LR-QDC-M-83-1 excludes the corresponding sections of Quad Cities Unit 2 from the scope of license renewal.. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to justify the exclusion of the above sections from the scope of license renewal and an AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-1, the applicant stated that it performed a plant walkdown on non-safety-related control rod drive (CRD) hydraulic piping at Quad Cities to identify those portions that could interact with safety-related SSCs. Portions of the non-safety-related piping were included in the scope of license renewal for either spatial considerations or because the piping is attached to safety-related SSCs. Because of the proximity of the CRDH headers to safety-related components, some situations exist where portions of piping in the center of a pipe run cannot spatially interact with any safety-related SSCs. For this reason, they were excluded from the scope of license renewal.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.3-1 acceptable because the excluded portions are non-safety-related and not in the proximity of any safety-related SSCs. Therefore, the staff considers its concern described in RAI 2.3.3.3-1 resolved.

RAI 2.3.3.3-2. License renewal boundary diagram LR-QDC-M-41-2 for Quad Cities Unit 1 excludes the piping from the exhaust water header and fittings and the pressure indicator 1-0302-77 from the scope of license renewal. However, the corresponding components for Quad Cities Unit 2 are identified as in the scope of license renewal per 10 CFR 54.4(a)(2) (license renewal boundary diagram LR-QDC-M-83-2). As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to justify exclusion of the above components of Quad Cities Unit 1 from the scope of license renewal and an AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-2, the applicant stated that it performed a plant walkdown on non-safety-related CRD hydraulic piping at Quad Cities to identify those portions that could interact with safety-related SSCs. Those portions of the non-safety-related piping on LR-QDC-M-41-2 and LR-QDC-M-83-2 were included in the scope of license renewal for spatial interaction with safety-related SSCs. The piping from the exhaust water header and fittings and the pressure indicator 1(2)-0302-77 cannot spatially interact with safety-related SSCs and were not included in the scope of license renewal. The applicant noted that it color-coded these components incorrectly as in the scope of license renewal on LR-QDC-M-83-2 for Quad Cities Unit 2. The applicant also noted that boundary diagram LR-QDC-M-41-2 correctly identifies those portions falling within the scope of license renewal.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.3-2 acceptable because the excluded portions are non-safety-related and not in the proximity of any safety-related SSCs. Therefore, the staff considers its concern described in RAI 2.3.3.3-2 resolved.

RAI 2.3.3.3-3. Several solenoid valves shown in license renewal boundary diagram LR-QDC-M-41-2 for Quad Cities Unit 1 (e.g., SO 1-0302-19A at location F-1) are identified as within the scope of license renewal. However, the piping connections to these valves are excluded from the scope of license renewal. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to justify exclusion of the above components from the scope of license renewal and an AMR.

Applicant's Response and Staff's Evaluation

In response to RAI 2.3.3.3-3, the applicant stated that the piping in question is non-safety-related instrument air system. The failure of this non-safety-related instrument air support system piping will not affect any of the CRDH system's intended functions. Loss of instrument air will cause the CRD scram valves to fail open, inserting the control rods into the core and causing other air-operated CRDH system valves to fail in their fail-safe positions. There are small segments of safety-related instrument air piping (such as that connecting solenoid valves SO 1-0305-117 and SO 1-0305-118) for each CRD hydraulic control unit that are included in the scope of license renewal.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.3-3 acceptable because the applicant stated that the piping in question is non-safety-related instrument air system; the failure of this non-safety-related instrument air support system piping will not affect any of the CRDH system's intended functions; and the small segments of safety-related instrument air piping for each CRD hydraulic control unit are included in the scope of license renewal. Therefore, the staff considers its concern described in RAI 2.3.3.3-3 resolved.

RAI 2.3.3.3-4. License renewal boundary diagram LR-QDC-M-41-2 for Quad Cities Unit 1 shows the pressure indicator, component PI 1-032-80, as within the scope of license renewal. However, a similar component at the same location, pressure switch, component PS 1-032-81 is excluded from the scope of license renewal. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to justify exclusion of component PI 1-032-80 from the scope of license renewal and an AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-4, the applicant stated that pressure indicator PI 1-0302-80, manual instrument shutoff valve 1-0302-80, and the connecting tubing to the non-safety-related instrument air system should not have been highlighted on boundary diagram LR-QDC-M-41-2. As stated in the response to RAI 2.3.3.3-3, the failure of this non-safety-related instrument air support system piping will not affect any of the CRDH system's intended functions. Therefore, both PI-0302-80 and PS 1-0302-81 are outside the scope of license renewal.

Based on its review of the applicant's clarification discussed above, the staff finds that the applicant's response to RAI 2.3.3.3-4 is in accordance with the criteria set forth in 10 CFR 54.4(a) and acceptable. Therefore, the staff considers its concern described in RAI 2.3.3.3-4 resolved.

RAI 2.3.3.3-5. License renewal boundary diagram LR-QDC-M-41-2 identified CRDs as within the scope of license renewal. However, LRA Table 2.3.3-3 does not list CRDs as within the scope of license renewal. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to justify the exclusion of CRDs from LRA Table 2.3.3-3.

Applicant's Response and Staff's Evaluation

In response to RAI 2.3.3.3-5, the applicant stated that component groups listed in LRA Table 2.3.3-3 only include those components requiring an AMR. Although CRDs are in the scope of license renewal, they were screened as "active" components. As such, they do not require an AMR and were not included in LRA Table 2.3.3-3.

Based on its review, the staff concurs with the applicant's clarification that CRDs are in the scope of license renewal, however, they are active components and not subject to an AMR. Therefore, the staff finds that the applicant's response to RAI 2.3.3.3-5 is in accordance with the criteria set forth in 10 CFR 54.4(a) and acceptable. The staff considers its concern described in RAI 2.3.3.3-5 resolved.

<u>RAI 2.3.3.3-6</u>. License renewal boundary diagram LR-QDC-M-41-2 for Quad Cities Unit 1 shows that the license renewal boundary for 2.5 in. piping section at location B-10 ends at an undistinguishable location. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to explain why (1) the piping section up to and including valve 1-0301-7, and (2) the corresponding piping section of Quad Cities Unit 2 (license renewal boundary diagram LR-QDC-M-83-2) up to and including valve 2-0301-7, were excluded from the scope of license renewal.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-6, the applicant stated that it performed a plant walkdown on non-safety-related CRDH. Portions of non-safety-related CRD hydraulic components depicted on boundary diagrams LR-QDC-M-41-2 and LR-QDC-M-83-2 are included in the scope of license renewal because the components could spatially interact with safety-related SSCs located in the same area. The CRD pump discharge line, 1(2)-8302C-2-1/2", is included in the scope of license renewal from the point that the line enters the reactor building (A-10) to where that line and others downstream of it no longer can spatially interact with safety-related SSCs.

Based on its review of the applicant's clarification discussed above, the staff finds that the applicant's response to RAI 2.3.3.3-6 is in accordance with the criteria set forth in 10 CFR 54.4(a) and acceptable. Therefore, the staff considers its concern described in RAI 2.3.3.3-6 resolved.

<u>RAI 2.3.3.3-7</u>. License renewal boundary diagram LR-QDC-M-83-1 for Quad Cities Unit 2 excludes the following 0.75 in.-diameter sections of piping between the reducer and the quick disconnect from the scope of license renewal:

- line containing valve 2-0301-139A at location A-7
- line containing valve 2-0301-138A at location A-7
- line containing valve 2-0301-137A at location B-7
- line containing valve 2-0301-136A at location C-7
- line containing valve 2-0301-136B at location C-4

However, license renewal boundary diagram LR-QDC-M-41-1 shows that the corresponding sections of Quad Cities Unit 1 are included in the scope of license renewal. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results.

Therefore, the staff requested (in RAI 2.3.3.3-7) the applicant to justify the exclusions of the above sections of Quad Cities Unit 2 from the scope of license renewal and an AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-7, the applicant stated that lines and valves 2-0301-136A, 2-0301-136B, 2-0301-137A, 2-0301-138A, and 2-0301-139A are included in the scope of license renewal. Boundary diagram LR-QDC-M-83-1 should have highlighted the components. They are included in LRA Table 2.3.3-3, under component group "NSR vents or drains, piping and valves (attached support)."

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.3-7 acceptable because it is in accordance with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers the concern described in RAI 2.3.3.3-7 resolved.

RAI 2.3.3.3-8. License renewal boundary diagram LR-DRE-M-34-1 for Dresden Unit 2 shows that the license renewal boundary for 1.5 in. piping section at location B-5 (cooling water pressure control station) ends at normally open valve 2-0301-72. The staff was not certain whether the license renewal boundary should continue beyond this valve. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to explain why (1) the piping section beyond this value, and (2) the corresponding piping section of Dresden Unit 3 (license renewal boundary diagram LR-DRE-M-365-1) beyond valve 3-0301-72 were excluded from the scope of license renewal.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-8, the applicant stated that it expanded the in-scope portion of the Dresden CRDH system as shown on license renewal boundary diagrams LR-DRE-M-34-1 and LR-DRE-M-365-1 to include all downstream pipe lines that would be isolated by closing valve 2(3)-0301-72. The applicant made this change in its responses to RAI 2.1-02 and to Supplement RAI 2.1-02b. The expanded boundary includes all of the piping, fittings, valves, and piping components downstream of valve 2(3)-0301-72, up to and including points of termination at blank flanges, at normally closed vent or drain valves, at instrumentation, or at points of interface with portions of the piping system already designated as in-scope for license renewal. The additional piping, fittings, valves, and piping components the applicant included in-scope are constructed of the same materials, are in the same environments, and perform the same intended functions as components listed in LRA Table 2.3.3-3. Therefore, LRA Table 2.3.3-3, which lists components groups of CRDH system requiring aging management review, needed no change to encompass the expanded in-scope boundary.

Based on its review of the applicant's expanded in-scope boundary discussed above, the staff finds the applicant's response to RAI 2.3.3.3-8 acceptable because it is in accordance with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers the concern described in RAI 2.3.3.3-8 resolved.

RAI 2.3.3.3-9. License renewal boundary diagram LR-DRE-M-365-1 for Dresden Unit 3 excludes the following sections of piping from the scope of license renewal:

- from valve 3-0301-60 to and including valve 3-0301-61 at location B-4
- from valve 3-0301-53 to and including valve 3-0301-54 at location B-2

However, the corresponding sections of Dresden Unit 2 are included in the scope of license renewal (license renewal boundary diagram LR-DRE-M-34-1). As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to justify the exclusions of the above sections of Dresden Unit 3 from the scope of license renewal and an AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-9, the applicant stated that it expanded the in-scope portion of the Dresden CRDH system to include sections of piping (1) from valve 3-0301-60 to and including valve 3-0301-61 and (2) from valve 3-0301-53 to and including valve 3-0301-54 as shown on License Renewal Boundary Diagram LR-DRE-M-365-1. This boundary expansion added active instruments dPT3-302-61 and dPT3-302-88 and their associated vent and equalizing valves. The additional piping/tubing and valves (passive components) the applicant included in-scope are constructed of the same materials, are in the same environments, and perform the same intended functions as components listed in LRA Table 2.3.3-3. Therefore, LRA Table 2.3.3-3, which lists components groups of CRDH system requiring aging management review, needed no change to encompass the expanded in-scope boundary.

Based on its review of the applicant's expanded in-scope boundary discussed above, the staff finds the applicant's response to RAI 2.3.3.3-9 acceptable because it is in accordance with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers the concern described in RAI 2.3.3.3-9 resolved.

<u>RAI 2.3.3.3-10</u>. License renewal boundary diagram LR-DRE-M-34-1 for Dresden Unit 2 shows that the license renewal boundary ends at valves 2-0301-67A and 2-0301-67B at locations C-5 and B-5 (stabilizing valves). The staff was not certain whether the license renewal boundary should continue beyond these valves. As such, the staff was unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, the staff requested the applicant to explain why (1) the piping section beyond these valves, and (2) the corresponding piping sections of Dresden Unit 3 (license renewal boundary diagram LR-DRE-M-365-1) beyond valves 3-0301-67A and 3-0301-67B, were excluded from the scope of license renewal.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.3-10, the applicant stated that it expanded the in-scope portion of the Dresden CRDH system as shown on License Renewal Boundary Diagrams LR-DRE-M-34-1 and LR-DRE-M-365-1 to include all downstream pipe lines that would be isolated by closing valves 2(3)-0301-67A and 2(3)-0301-67B. The applicant made this change in its responses to RAI 2.1-02 and to Supplement RAI 2.1-02b. The expanded boundary includes all of the piping, fittings, valves, and piping components downstream of valves 2(3)-0301-67A and 2(3)-0301-67B, up to and including points of termination at blank flanges, at normally closed vent or drain valves, at instrumentation, or at points of interface with portions of the piping system already designated as in-scope for license renewal. The additional piping, fittings, valves, and piping components the applicant included in-scope are constructed of the same materials, are in the same environments, and perform the same intended functions as components listed in LRA Table 2.3.3-3. Therefore, LRA Table 2.3.3-3, which lists components groups of CRDH system requiring aging management review, needed no change to encompass the expanded in-scope boundary.

Based on its review of the applicant's expanded in-scope boundary discussed above, the staff finds the applicant's response to RAI 2.3.3.3-10 acceptable because it is in accordance with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers the concern described in RAI 2.3.3.3-10 resolved.

2.3.3.3.3 Conclusions

The staff reviewed LRA Section 2.3.3.3, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the CRDH system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the CRDH system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.4 Reactor Water Cleanup System

2.3.3.4.1 Summary of Technical Information in the Application

The applicant described the reactor water cleanup (RWCU) system in LRA Section 2.3.3.4 and provided a list of components subject to an AMR in LRA Table 2.3.3-4.

The RWCU system has the functions to remove insoluble, waterborne activation products from reactor coolant; prevent soluble inorganic impurities (i.e., chlorides) from concentrating in the reactor coolant and exceeding specified water quality limits; reduce beta and gamma radiation sources in the reactor coolant resulting from the presence of corrosion and fission products; and remove water from the reactor coolant system at reduced activity levels during startup and shutdown.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following RWCU system intended functions:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment

- supports ESF function(s)—supports the ESF function of the standby liquid control system by shutdown of RWCU pumps and closure of RWCU valves to prevent dilution or removal of the injected boron

- credited in regulated event(s)—credited in evaluation of the Appendix R fire and in the ATWS events (The system also contains components relied upon for compliance with 10 CFR 50.49 (EQ))

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The RWCU system consists of pumps, regenerative and nonregenerative heat exchangers, demineralizers, filters (Quad Cities only), containment isolation valves, and associated piping, valves, and instrumentation and controls. The system provides continuous purification of a portion of the reactor coolant recirculation flow with a minimum of heat loss and water loss from the cycle. It can be operated during startup, shutdown, refueling operations, and during normal operation. The system takes suction from the reactor recirculation system at the shutdown cooling system connection at Dresden and the reactor recirculation pump suction connection at Quad Cities, and the reactor vessel bottom drain connection. From these two suction sources, reactor water impurities are removed by directing the flow through the system's major components, piping, and supporting components, and then back to the reactor vessel via the feedwater system at Dresden and via the RCIC system at Quad Cities. The regenerative heat exchangers transfer heat from the water leaving the reactor to the water returning to the reactor. The nonregenerative heat exchangers are cooled by water from the reactor building close cooling water system.

Containment isolation capability is provided by four motor-operated containment isolation valves. The RWCU system maintains the integrity of the reactor coolant pressure boundary and the RWCU system can be isolated from the reactor coolant system by closure of the containment isolation valves.

During refueling at Quad Cities, the RWCU system, in conjunction with the fuel pool filter demineralizers, maintains fuel pool water clarity and reduced activity levels.

In LRA Section 2.3.3.4, the applicant described the evaluation boundary of the RWCU system. In addition, the applicant highlighted those portions of the RWCU system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.4. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the RWCU system in LRA Table 2.3.3-4 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- NSR vents or drains, piping, and valves (structural integrity/attached support)
- piping and fittings (pressure boundary)
- piping and fittings (structural integrity/attached support)
- piping and fittings (spatial interaction, Quad Cities only)
- small bore piping and fittings (pressure boundary)
- sight glasses (structural integrity/attached support, Dresden Only)
- valves (pressure boundary)
- valves (structural integrity/attached support)
- valves (spatial interaction, Quad Cities only)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1 and clarified in a letter, dated June 22, 2004, the applicant expanded the system boundaries for the RWCU system at Dresden Station due to the potential for spatial interaction with safety-related components. Specifically, the applicant added associated piping components lines 2-3324-1"-H, 2/3-1223-8-LX, and 2-3318-1-L of the RWCU system shown on revised boundary diagram LR-DRE-M-30 and lines 2/3-1223-8"-H, 3-5503-4"-H, and 2-5508-4"-H of the RWCU system shown on new boundary diagram LR-DRE-M-45-1 to the scope of license renewal. This boundary expansion includes more of the same type of components already represented on Table 2.3.3-4 of the LRA. As such, no changes to Table 2.3.3-4 were required.

2.3.3.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.4, Dresden UFSAR Section 5.4.8 and Quad Cities UFSAR Section 5.4.8. Additionally, the staff reviewed other UFSAR sections that discussed the RWCU system to determine whether there is reasonable assurance that the RWCU system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). At Dresden these sections included 3.2.9, 3.6.1, 3.6.2, 3.11.1, 5.0, 5.1, 5.2.3, 7.1.3, 7.3.2, 7.5.2, 9.1.4, 9.2.6, 9.3.2, 9.3.5, 11.5.2.6, 12.2, 12.3.2, 123A.3, 14.2.4, 15.6.4, and 15.8.6. At Quad Cities these sections included 3.6.1, 3.11.1, 5.1.3, 5.2.3, 5.4.3, 5.4.7, 5.4.8, 7.1.3, 7.3.1, 9.1.3, 9.2.3, 9.2.6, 9.3.1, 9.3.2, 9.3.5, 10.4.6, 11.2.2, 11.5.2, 12.2, and 12.3.2. The staff's review was conducted in accordance with Section 2.3 of the SRP-LR.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the RWCU system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the RWCU system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the RWCU system. The staff then reviewed the referenced P&I drawings to verify that those portions of the RWCU system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.4 and that the applicant identified all RWCU system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the RWCU system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.4 and that the RWCU system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-4. The staff did not identify any omissions.

2.3.3.4.3 Conclusions

The staff reviewed LRA Section 2.3.3.4 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the RWCU system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the RWCU system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.5 Fire Protection System

2.3.3.5.1 Summary of Technical Information in the Application

The applicant described the fire protection (FP) systems in LRA Section 2.3.3.5 and provided a list of component groups subject to an AMR in LRA Table 2.3.3.5.

The FP systems provide the means for detecting, alarming, isolating, and suppressing fires at Dresden Units 2 and 3 and Quad Cities Units 1 and 2. These systems include the following subsystems and attributes:

- The fire detection and alarm system, referred to as the fire computer 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, Halon 1301 systems, carbon dioxide (CO_2) 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.

The FP systems are relied upon to meet the requirements of 10 CFR 50.48, “Fire Protection Rule,” and Appendix R to 10 CFR Part 50, “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979.” The plants are divided into unique fire areas as required by Appendix A of Branch Technical Position (BTP) Auxiliary and Power Conversion System Branch (APCSB) 9.5-1, “FP for Nuclear Power Plants.” The SSCs satisfying the safe-shutdown requirements of Appendix R are contained in the safe-shutdown equipment list (SSEL) and captured by the review conducted for 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2). The applicant provided technical position papers which summarize the results of the review performed on the fire protection program (FPP) documents and summarize the systems and structures necessary to demonstrate compliance with 10 CFR 50.48.

2.3.3.5.2 Staff Evaluation

The staff reviewed LRA Sections 2.1.3.5 and 2.3.3.5, UFSAR Section 9.5.1, and FP technical position papers to determine whether there is reasonable assurance that the FP system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively.

In the performance of the review, the staff selected system functions described in the UFSAR that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

The staff also reviewed SERs referenced for the FP program which summarize the FPP and commitments made to meet 10 CFR 50.48 using the guidelines of Appendix A to BTP APCSB 9.5-1 and Appendix R. The staff sampled portions of these SERs to verify that the functions of the FP components relied upon to satisfy the provisions of Appendix A to BTP APCSB 9.5-1 and Appendix R were included within the scope of license renewal as intended functions in the LRA.

After the staff's initial review of the LRA, the staff identified several concerns regarding the scoping and screening of FP SSCs required for compliance with 10 CFR 50.48. Section 2.1.3.5 of the LRA states that technical position papers were developed for FP which summarize the results of a detailed review of the FPP documents demonstrating compliance with 10 CFR 50.48 and 10 CFR 50 Appendix R, Sections III.G, III.J, III. L, and III.O. It is unclear that these position papers also included the licensing commitments contained in the applicant's response to Appendix A to the BTP APCSB 9.5-1 and the SERs resulting from the review of those responses. In a letter dated August 4, 2003, the staff requested that the applicant clarify that plant commitments contained in FP SERs, and other plant documentation which may also reflect the plant FP CLB, were included in the development of the technical position papers to ensure that all FP SSCs relied upon for compliance with 10 CFR 50.48 were included within the scope of license renewal (RAI 2.3.3.5-1a). In a letter dated October 3, 2003, the applicant responded that the Dresden and Quad Cities FP position papers identify those SSCs relied upon to demonstrate compliance with 10 CFR 50.48. These include SSCs credited with satisfying the commitments contained in the responses to Appendix A to BTP APCSB 9.5-1, and the SERs resulting from the review of those responses, and SSCs credited with satisfying any FP SERs issued before BTP APCSB 9.5-1 was published. The staff reviewed the applicant's response and agreed that the applicant included these bases in the scoping process.

LRA Section 2.3.3.5 lists "detects fires" as a system purpose and references the fire computer system, which includes initiation devices. This fire detection/alarm computer system is not referenced elsewhere in the LRA, for example, as part of the scoping and screening of the electrical and instrumentation systems. By letter dated August 4, 2003, the staff requested that the applicant clarify where the fire detection and alarm systems and components are addressed in the LRA (RAI 2.3.3.5-1b). In a letter dated October 3, 2003, the applicant responded that although the fire computer system, including smoke detectors, heat sensors, pressure/flow sensors, and actuation devises for preaction systems, is within the scope of license renewal, all of the components in the system were categorized as "active" based on the determinations documented in NEI 95-10, Appendix B, and are not subject to an AMR. Therefore, they are not discussed in LRA Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Control Systems." The staff reviewed the applicant's response and agreed that the components are categorized as active.

The staff reviewed the LRA boundary drawings included with the LRA to assess what portions of the FP system were in scope. In a letter dated August 4, 2003, the staff asked the applicant to clarify information contained in the LRA boundary drawings for Dresden (RAI 2.3.3.5-1c through f). In the response dated October 3, 2003, the applicant provided the following clarifications.

> LR–DRE-M-23-1: LRA boundary drawing LR-DRE-M-23-1 should have highlighted valves PIV 1-4199-187, PIV 1-4199-188, PIV 1-4199-189, PIV 1-4199-190, PIV 1-4199-194, fire hydrants FH-30, FH-31 at drawing coordinates C-10 and the piping segments associated with these valves and hydrants. The piping segment up to and including these valves and hydrants are included in the scope of license renewal. The FP piping, and components down stream of these valves are not included as part of the plant FP plan and do not perform functions that demonstrate compliance with 10 CFR 50.48. Fire hydrants FH-8, FH-9 and FH-10 at drawing coordinate A-4 on LRA boundary drawing LR-DRE-M-23-1 and fire hydrant FH-33 at drawing coordinate E-7 on LRA boundary drawing LR-DRE-M-23-1 are within the scope of license renewal. LRA boundary drawing LR-DRE-M-23-1 should have included those components within the scope of license renewal.
>
> LR-DRE-M-23-4: The portions of Unit 1 FP piping shown on LRA boundary drawing LR-DRE-M-23-4 that perform functions necessary to demonstrate compliance with 10 CFR 50.48 are the fire hose stations F21 (drawing coordinate C-8), F22 (drawing coordinate C-5), F23 (drawing coordinate C-6), F27 (drawing coordinate A-5), F29 (drawing coordinate C-8), and F47 (drawing coordinate C-2), the West Aux Bay North and South sprinkler systems, and the piping connected to Unit 2 and 3 FP piping up to and including the isolation values that connect to the Unit 1 piping. The Unit 1 fire hose stations are in scope because they are included as part of the Dresden Unit 2 and 3 FP plan. The West Aux Bay North system and South sprinkler system are in scope because of the cable concentrations in the Unit 1 West Auxiliary Bay, located below the Unit 2 control room. All remaining piping, valves, fire hose station, service water drops, and sprinkler systems pertaining to Unit 1 are not included as part of the Dresden Unit 2 and 3 FP plan and do not perform functions that demonstrate compliance with 10 CFR 50.48.
>
> LRA boundary drawing LR-DRE-M-23-4 contains some boundary interfaces that do not end at an isolation valve. At location A-8, the piping down stream of valve 1-4199-134 up to and including valve 1-4199-264 should not have been highlighted and does not belong within the scope of license renewal. A small portion of piping down stream of valves 1-4199-314 (drawing coordinate E-6), 1-4199-315 (drawing coordinate E-6) and 1-4199-131 (drawing coordinate D-8) should not have been highlighted. These portions of pipe do not belong within the scope of license renewal. LRA boundary drawing LR-DRE-M23-4 should have excluded these components from the scope of license renewal.
>
> LR-DRE-M-23-5: Those portions of Unit 1 FP piping shown on LRA boundary drawing LR-DRE-M-23-5 that perform functions necessary to demonstrate compliance with 10 CFR 50.48 are fire hose stations F11 (drawing coordinate F-3) and F37 (drawing coordinate B-10), the Unit 1 emergency diesel driven fire pump (drawing coordinate D-2) and sprinkler system (drawing coordinate F-5), and the piping connected to the Unit 2 and 3 FP piping up to and including the isolation values that connect to the Unit 1 piping. Fire hose stations F11 and F37 are in scope because they are included as part of the Dresden Unit 2 and 3 FP plan. The emergency diesel driven fire pump and sprinkler system are in scope to facilitate protection of the Unit 1 emergency diesel driven fire pump.
>
> All remaining piping, valves, fire hose stations, service water drops, and sprinkler systems pertaining to Unit 1 are not included in the Dresden Unit 2 and 3 FP plan and do not perform functions necessary to demonstrate compliance with 10 CFR 50.48. Those FP components falling within the scope of license renewal can be isolated from those sections outside the scope of license renewal by manually closing isolation valves that are within the scope of license renewal. Degradation of any pressure retaining components located in the out-of-scope portions of the FP system would be identified through a drop in fire header pressure and isolated.
>
> A review of LRA boundary drawing LR-DRE-M-23-5 identified a boundary interface at drawing coordinate A-9 that does not at end at an isolation valve. A field walk down determined that this pipe has been cut and capped. Valve 1-4199-502-DV at drawing coordinate F-6 should have been highlighted, is within the scope of license renewal and was evaluated for aging management.

LR-DRE-M-4204: The fire sprinkler systems shown in the ISCO makeup pump building rooms A&B on LRA boundary drawing LR-DRE-M-4204 are within the scope of license renewal and subject to an AMR. LRA boundary drawing LR-DRE-M-4204 should have included these components within the scope of license renewal. This sprinkler system was evaluated for aging along with the other sprinkler systems shown on the boundary diagram.

The staff reviewed the response provided by the applicant and concurs with the changes to the LRA boundary drawings proposed by the applicant on the basis that these portions of the FP system are in the scope of license renewal.

In a letter dated August 4, 2003, the staff asked the applicant to clarify information contained in LRA drawing LR-QDC-M-27-1 for Quad Cities (RAI 2.3.3.5-1g). By letter dated October 3, 2003, the applicant supplied the following clarifications. The fire hydrants on LRA boundary drawing LR-QDC-M-27-1 at drawing coordinates D-1, D-2, and E-4 are within the scope of license renewal and are subject to an AMR. These fire hydrants should have been highlighted. The fire hydrants at drawing coordinates F-7, G-6, and G-7 are located downstream of isolation valve 1/2-4199-278 (drawing location F-6), are not included as part of the plant FP plan, and do not perform functions that demonstrate compliance with 10 CFR 50.48. For these reasons, they were not included within the scope of license renewal. The fire hydrants at drawing coordinates G-2 and G-3 are incorrectly shown as being located upstream of isolation valve 1/2-4199-288. A field walkdown verified that these hydrants are located downstream of isolation valve 1/2-4199-288 (drawing coordinate G-4). These hydrants are not included as part of the plant FP plan and do not perform functions that demonstrate compliance with 10 CFR 50.48.

The staff reviewed the response provided by the applicant and concurs with the clarifications on the basis of those portions of the FP system that are included in the plant FP plan. The staff also agrees that the portions of the FP water system located downstream of isolation valve 1/2-4-199-228 are not in the scope of license renewal, since they are not part of the licensing basis.

Section 5.4.6.3 of the Dresden UFSAR states that the Unit 2 and 3 diesel-driven fire pump, or the Unit 1 diesel-driven fire pump, automatically provide a backup supply of river water to the FP system on low system pressure. LRA Sections 2.3.3.5 and 2.3.3.13 state that the fire pump diesels for Dresden are evaluated with the FP system. While the fire pump diesels are considered active components, and therefore may be excluded from the scope of license renewal, supporting components and subsystems of the fire pump diesels should appear in Table 2.3.3.5 of the LRA. In a letter dated August 4, 2003, the staff requested that the applicant identify the portions of the diesel fire pump that were intended to be included within the scope of license renewal and clarify how they may be included in LRA Table 2.3.3.5 (RAI 2.3.3.5-1i). In a letter dated October 3, 2003, the applicant submitted the table below to identify those portions of the diesel fire pump addressed by LRA Table 2.3.3-5.

Long-lived, passive components for the fire pump diesels and diesel fire pump subsystem are included in LRA Table 2.3.3-5.

Equipment Description	LRA Table 2.3.3-5 Component Group
diesel fire pump suction screens	filters/strainers
strainer diesel fire pump deluge system	filters/strainers
fire pump diesel cooling water strainer	filters/strainers
diesel fire pump room supply air damper	fire dampers
fire pump diesel silencer	mufflers
diesel fire pump headers	piping and fittings
sprinkler system fire pump diesel day tank	piping and fittings
fire diesel sprinkler	piping and fittings
diesel fire pump	pumps
sprinkler system fire pump diesel day tank	sprinklers
fire pump diesel oil day tank	tanks
diesel fire pump deluge system valves	valves
diesel fire pump cross-tie valves	valves
fire pump diesel cooling water valves	valves
diesel fire pump discharge valves	valves
fire pump diesel engine lubrication oil valves	valves
diesel fire pump supply valves	valves
fire pump diesel day tank valves	valves
fire pump diesel instrumentation valves	valves

The staff finds the applicant's response acceptable on the basis that the components of the diesel fire pump identified are within the scope of the license renewal and subject to an AMR.

Since no LRA boundary drawings were provided for the Halon 1301 fire suppression systems, the staff requested in a letter dated August 4, 2003, that the applicant clarify which systems and components are within scope and are covered in the AMR (RAI 2.3.3.5-1j). In a letter dated October 3, 2003, the applicant stated that a P&ID for the Halon 1301 system at Dresden does not exist. As such, an LRA boundary drawing was not created for that portion of the FP system. There are three Halon subsystems at Dresden that are completely independent of one another. These subsystems protect the record retention vault, the process computer room, and the auxiliary electric equipment room/primary computer room. The Halon 1301 subsystems for the record retention vault and the process computer room are not included within the scope of license renewal because they are not included in the plant FP plan and do not perform functions that demonstrate compliance with 10 CFR 50.48. However, the entire subsystem supporting the auxiliary electric equipment room/primary computer room is within the scope of license renewal. LRA Table 2.3.3-5 evaluates these components in component groups—piping and fittings (including flex hoses, hose reels, hoses, nozzles, tubing, sprinklers, and gaskets of buried components), aging management reference 3.3.1.5 and 3.3.2.138; and valves (including nozzles), aging management reference 3.3.2.23 and 3.3.2.260.

The applicant further indicated that the Halon bottles/cylinders are considered consumable FP equipment, are replaced based on condition, and, therefore, are not considered long-lived components.

At Quad Cities, Halon is only used in areas that do not house any safe shutdown equipment (training building, records storage building, and new computer room). Therefore, the Halon system at Quad Cities is not within the scope of license renewal because it is not included in the plant FP plan and does not perform functions that demonstrate compliance with 10 CFR 50.48.

The staff finds the applicant's response acceptable on the basis that the applicant has included the Halon system in the Dresden plant auxiliary electric equipment room/primary computer room in the scope of license renewal as it is included in the Dresden FPP, and excluded the Halon system at Quad Cities that does not perform an intended function.

The staff identified the use of water shields or baffles referenced in the Quad Cities response to BTP APCSB 9.5-1 and requested that the applicant confirm that these components were included within the scope of license renewal and subject to an AMR, or justify their exclusion (RAI 2.3.3.5-1k). The applicant responded in a letter dated October 3, 2003, that the water shields referenced in Amendment 2 to the Quad Cities response to BTP APCSB 9.5-1 were never installed. This configuration was clarified in the Quad Cities Fire Protection Report, Volume 1, Section 4.3-3889, Revision 13, issued August 2001. Because these shields were never installed, they are not included within the scope of license renewal.

The staff reviewed the applicant's response and concurs, on the basis that these shields were never installed, that they are not included within the scope of license renewal and subject to an AMR.

Portable equipment, such as fire extinguishers, self-contained breathing air packs, fire hoses, and portable ductwork, are not included in the LRA. The staff believes that these components should be within the scope of the license renewal, but exempt from an AMR, because portable equipment is typically replaced on condition. These standards require the replacement of portable equipment based on their condition or performance during testing and inspection. These portable components are not long-lived and are maintained per the NFPA standards; therefore an AMR is not required. In a letter dated August 4, 2003, the staff requested that the applicant identify where in the LRA these components are identified as being within the scope of license renewal, or provide a technical justification for their exclusion (RAI 2.3.3.5.1-l). In a letter dated October 3, 2003, the applicant responded that portable FP equipment is included within the scope of license renewal but is not discussed in the LRA. Section 2.1.5.4 of the LRA should have been written as in the following section to be consistent with the NRC letter from Mr. C. I. Grimes to Mr. D. J. Walters of NEI, dated March 10, 2000, regarding License Renewal Issue No. 98-12, "Consumables."

2.3.3.5.3 Consumable Fire Protection Equipment

Fire extinguishers, self-contained breathing air packs, fire hoses, and portable ductwork (smoke ejectors) are within the scope of license renewal, but are not subject to aging management because they are replaced on condition. These components are periodically inspected in accordance with National Fire Protection Association (NFPA) standards. These standards require replacement of equipment based on their condition or performance during testing and inspection. These components are not long-lived and therefore, aging management is not required.

2.3.3.5.4 Conclusions

The staff reviewed LRA Section 2.3.3.5, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the FP system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the FP system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.6 Emergency Diesel Generator and Auxiliaries

2.3.3.6.1 Summary of Technical Information in the Application

The applicant described the emergency diesel generator (EDG) and auxiliary systems in LRA Section 2.3.3.6 and provided a list of components subject to an AMR in LRA Table 2.3.3-6.

The function of the EDG and auxiliary systems is to provide an emergency source of AC power to the emergency core cooling system or safe shutdown equipment for each unit following a design basis accident and/or in the event of loss of offsite power (LOOP). Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following EDG and auxiliary systems intended functions:

- provide emergency AC power—provides independent power source to assure safe reactor shutdown under emergency conditions on a total loss of offsite power concurrent with a design basis accident.

- credited in regulated event(s)—credited in support of fire protection (10 CFR 50.48) (The system contains components that are relied upon for compliance with 10 CFR 50.49 (EQ)).

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected.

The EDG and auxiliary systems consist of three EDGs per site—one EDG per reactor and a shared EDG. Each EDG, located in a separate diesel generator room, is an assembly containing a diesel engine and a generator. Section 54.21(a)(1) of Title 10 of the *Code of Federal Regulations* recognizes that EDGs are active and excludes them from the group of equipment subject to AMR. However, the auxiliary systems for each EDG are within the scope of the Rule and subject to an AMR. These auxiliary systems include the following:

- EDG room ventilation system
- EDG jacket water system
- EDG air start system
- EDG lubrication system
- EDG combustion air intake and exhaust system
- EDG cooling water system

- EDG fuel oil storage and transfer system

EDG Room Ventilation System

The staff's evaluation of the EDG room ventilation system is provided in Section 2.3.3.6A of this SER.

EDG Jacket Water System

The EDG jacket water system provides cooling to the lube oil cooler and other diesel engine subcomponents, and maintains the diesel engine at an acceptable starting temperature during standby. The system is a closed loop system that starts with the EDG jacket water heat exchangers, passes through the diesel engine and lube oil cooler, and returns to the heat exchanger. It includes engine-driven pumps, an immersion heater, expansion tank, piping, valves, and controls and instrumentation. Cooling water for the EDG jacket water heat exchangers is provided by the EDG cooling water system.

EDG Air Start System

The EDG air start system stores and delivers sufficient air to start the diesel engine in the event of a LOOP. Each EDG has an independent air starting system which primarily consists of a set of two starting air compressors, four air receivers, two moisture separators, two air-driven starting motors and piping, valves, and controls and instrumentation. The system starts with the EDG starting air compressors, then passes through the air receivers, and moisture separators, to the EDG start motors. Because the air receivers are designed to store and provide sufficient air, as required to start the EDG, those portions of the system used for charging the air receivers have no safety function and are noncritical quality elements. Therefore, the air compressors and associated equipment are not included in the license renewal scope.

EDG Lubrication System

The EDG lubrication system provides lubrication to the EDG and subcomponents, and maintains the diesel engine at an acceptable starting temperature during standby. The system includes five pumping circuits for each EDG. The lubrication system evaluation boundary for each EDG starts from the engine sump, then passes through strainers, pumps, filters, and coolers, to the supplied service for each of the five circuits. It includes piping, valves, and controls and instrumentation. Also included is the oil pumping circuit for the governor drive assembly.

EDG Combustion Air Intake and Exhaust System

The EDG combustion air intake and exhaust system provides filtered air for engine combustion and removes exhaust gases to the outside. The system evaluation boundary starts from the air intake hood, then passes through intake filters, the engine, the exhaust manifold, the exhaust silencer, and the outlet screen.

EDG Cooling Water System

The EDG cooling water system is described in LRA Section 2.3.3.12. The staff's evaluation of the EDG cooling water system is provided in Section 2.3.3.12 of this SER.

EDG Fuel Oil Storage and Transfer System

The EDG fuel oil storage and transfer system is described in LRA Section 2.3.3.13. The staff's evaluation of the fuel oil storage and transfer system is provided in Section 2.3.3.13 of this SER.

In LRA Section 2.3.3.6, the applicant described the evaluation boundary of each EDG auxiliary system. In addition, the applicant highlighted those portions of the EDG auxiliary systems and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.6. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the EDG auxiliary systems in LRA Table 2.3.3-6 as being within the scope of license renewal and subject to an AMR:

- air accumulator vessels, including tanks (pressure boundary)
- closure bolting (pressure boundary)
- debris screens (filter, Quad Cities only)
- doors, closure bolts, and equip frames, including dampers, duct, and housings (pressure boundary)
- duct fittings, hinges, and latches, including anchors, bolts, and fasteners (pressure boundary)
- filters/strainers (pressure boundary)
- filters/strainers (filter)
- flex collars, doors, and damper seals (pressure boundary)
- flexible hoses (pressure boundary)
- heat exchangers, including coolers (pressure boundary)
- heat exchangers, including coolers (heat transfer)
- lubricators (pressure boundary)
- NSR vents or drains, piping, and valves (structural integrity/attached support, Quad Cities only)
- piping and fittings, including dryers, heaters, and tubing (pressure boundary)
- piping and fittings (structural integrity/attached support)

- pumps (includes governors)
- restricting orifices (pressure boundary)
- restricting orifices (throttle)
- sight glasses (pressure boundary)
- tanks (pressure boundary)
- thermowells (pressure boundary)
- tubes, including heat exchangers (heat transfer, Quad Cities only)
- tubing (pressure boundary)
- tubing (structural integrity/attached support, Quad Cities only)
- turbochargers (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached support, Quad Cities only)

2.3.3.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.6, Dresden UFSAR Sections 8.3.1, 9.4.7, 9.5.4, 9.5.5, 9.5.6, 9.5.7, and 9.5.8, and Quad Cities UFSAR Sections 8.3.1, 9.4.5, 9.5.4, 9.5.5, 9.5.6, 9.5.7, and 9.5.8 to determine whether there is reasonable assurance that the EDG auxiliary system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with the Section 2.3 of the SRP-LR.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the EDG auxiliary systems in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the EDG auxiliary systems that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the EDG auxiliary systems. The staff then reviewed the referenced P&I drawings to verify that those portions of the EDG auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.6 and that the applicant identified all EDG auxiliary systems components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the EDG auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.6. The EDG auxiliary systems components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-6. The staff did not identify any omissions.

2.3.3.6.3 Conclusions

The staff reviewed LRA Section 2.3.3.6 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff id not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the EDG and auxiliary systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the EDG and auxiliary systems that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.6A Diesel Generator Room Ventilation

2.3.3.6A.1 Summary of Technical Information in the Application

The applicant described the EDG room ventilation system in LRA Section 2.3.3.6 and provided a list of components subject to an AMR in LRA Table 2.3.3-6.

The design function of the EDG room ventilation system is to maintain a suitable environment for equipment operation during normal and emergency operating modes when the EDG is required. Based on 10 CFR 54.4, and using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following EDG room ventilation system intended functions:

- credited in regulated event(s)—credited in support of fire protection (10 CFR 50.48) and contains components that are relied upon for compliance with 10 CFR 50.49 (EQ).

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected.

Each EDG room has an independent ventilation system. Each ventilation system has a supply fan which auto starts when the EDG starts. The fan draws in either outside air or turbine building air through temperature-controlled modulation dampers, isolation dampers, and fire dampers. The air exhausts the room through pneumatically operated dampers. Each ventilation system is used only when its respective EDG is operating.

In LRA Section 2.3.3.6, the applicant described the evaluation boundary of the EDG room ventilation system. In addition, the applicant highlighted those portions of the EDG room ventilation system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.6. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified and included the EDG room ventilation system component group subject to an AMR in LRA Table 2.3.3.6, which lists all mechanical components of the EDG auxiliary systems.

2.3.3.6A.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.6, Dresden UFSAR Section 9.4.7, and Quad Cities UFSAR Section 9.4.5 to determine whether there is reasonable assurance that the system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the EDG room ventilation system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the EDG room ventilation system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the EDG room ventilation system. The staff then reviewed the referenced P&I drawings to verify that those portions of the EDG room ventilation system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.6 and that the applicant identified all EDG room ventilation system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the EDG room ventilation system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.6 and that the EDG room ventilation system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-6. The staff did not identify any omissions.

2.3.3.6A.3 Conclusions

The staff reviewed LRA Section 2.3.3.6 and the accompanying scoping boundary drawings to determine whether any SSCs that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the EDG room ventilation systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the EDG room ventilation systems that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.7 Main Control Room Heating, Ventilation, and Air Conditioning

2.3.3.7.1 Summary of Technical Information in the Application

The applicant described the main control room heating, ventilation, and air conditioning (CRV-HVAC) system in LRA Section 2.3.3.7 and provided a list of components subject to an AMR in LRA Table 2.3.3-7.

The CRV-HVAC system has the functions to—provide a suitable environment during normal operation for the control room operators and equipment; provide a habitable environment after a design basis accident in which the operators can safely shutdown and maintain the plant for the duration of the accident; provide an environment from which the operators can safely occupy and operate the plant during an onsite or offsite toxic chemical accident; provide detection and protection for control room personnel from radioactive contamination or smoke released to the atmosphere; provide detection and protection for control room personnel from toxic gas (Quad Cities); provide fire protection to the operators with fire dampers for fires outside the control room, and a smoke purge function mode for fires inside the control room; and meet the seismic Category I requirements for all safety-related system components.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following CRV-HVAC system intended functions:

- isolation and filtration—provides isolation and filtration for the control room during accident conditions

- environmental control—provides habitable environment for the control room during normal, abnormal, accident, and postaccident conditions

- credited in regulated event(s)—demonstrates compliance with NRC regulations regarding station blackout (10 CFR 50.63) and fire protection (10 CFR 50.48)

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The CRV-HVAC system consists of the train-A HVAC system (a multizone unit), the train B HVAC system (a single zone unit), the emergency air filtration unit (AFU), the toxic gas analyzer system, and the smoke detection system. Each system train includes manual and air-operated dampers, an air handling unit (AHU), and distribution air ducts to and from the control room (including the cable spreading room and the auxiliary electric equipment room for Quad Cities) and the train-B HVAC equipment room. The train-A HVAC system also included an exhaust fan and the smoke detection system. The train-B HVAC system also included the AFU, associated booster fans, a refrigeration condensing unit (RCU), the toxic gas analyzer system, and associated valves, and instrumentation and controls. A sprinkler system is also provided to the AFU from the fire protection system (evaluated with the fire protection system). The train-A

AHU is the primary unit to provide the temperature control and air distribution for the control room. The train-B AHU serves as a backup to the train-A AHU and provides the source of cooling for the control room in the event the train-A AHU is lost. During normal operation, outside air is mixed with return air to maintain the control room emergency zone at a positive pressure. In the event of a design basis accident, the normal outside air intakes are isolated, and the AFU provides filtered makeup air to maintain pressurization of the control room emergency zone. In the event smoke is detected in the intake air ducts, the train-A HVAC system outdoor air-intake is automatically isolated and the system air is recirculated. In the event smoke is detected in the return air ducts, the train-A HVAC system is automatically switched to the purge mode and the system is supplied with 100 percent outdoor air. The train-B RCU is normally cooled with SW (evaluated with the SW system). However, upon loss of SW, the RCU may be cooled by containment cooling SW (evaluated with the containment cooling SW system) at Dresden and by residual heat removal SW (evaluated with the residual heat removal SW system) at Quad Cities. The toxic gas analyzer (at Quad Cities) continuously monitors the outside air intake of the operating AHU, and automatically isolates outdoor air intakes in the event specified toxic gas limits are approached. The toxic gas analyzer at Dresden has been determined to not be needed, and has been abandoned in place. If required, the outdoor air intakes can still be manually isolated.

In LRA Section 2.3.3.7, the applicant described the CRV-HVAC system evaluation boundary. In addition, the applicant highlighted those portions of the CRV-HVAC system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.7. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the CRV-HVAC system in LRA Table 2.3.3-7 as being within the scope of license renewal and subject to an AMR:

- air handlers heating/cooling (CRV-HVAC) (pressure boundary)
- air handlers heating/cooling (CRV-HVAC) (heat transfer)
- dampeners (pressure boundary, Quad Cities only)
- debris screens (filter)
- diffusers (pressure boundary)
- doors, closure bolts, and equip frames, including dampers, duct, housings, and silencers (pressure boundary)
- duct fittings, hinges, and latches (pressure boundary)
- filters/strainers (pressure boundary)
- filters/strainers (filter)
- flex collars, doors, and damper seals, including duct (pressure boundary)
- flow elements (throttle, Dresden only)
- heat exchangers (pressure boundary)
- heat exchangers (heat transfer)
- housings and supports (pressure boundary)
- NSR vents or drains, piping, and valves (structural integrity/attached support, Dresden only)
- piping and fittings (pressure boundary)
- piping and fittings (structural integrity/attached support, Quad Cities only)
- seals (pressure boundary)
- sight glasses (pressure boundary)
- tubing (pressure boundary, Dresden only)
- valves including dampers (pressure boundary)

2.3.3.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.7, Dresden UFSAR Sections 6.4 and 9.4.1, and Quad Cities UFSAR Sections 6.4 and 9.4.1 to determine whether there is reasonable assurance that the CRV-HVAC system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the CRV-HVAC system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the CRV-HVAC system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the CRV-HVAC system. The staff then reviewed the referenced P&I drawings to verify that those portions of the CRV-HVAC system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.7 and that the applicant identified all CRV-HVAC system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.7 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.7-1. Ductwork in the main control room HVAC systems is identified on ventilation system flow diagrams referenced in the LRA as within the scope of license renewal. Ductwork performs the intended function of a pressure boundary. However, it is not included in the AMR results in Table 2.3.3-7 of the LRA. Therefore, the staff requested the applicant to clarify whether ductwork is subject to an AMR and provide the relevant information about this component to enable the staff to complete its review of Table 2.3.3-7 in the LRA (Component Groups Requiring AMR- HVAC). If ductwork is not subject to an AMR, provide justification for its exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.7-1 states that the ductwork in the main control room HVAC systems is included within the scope of license renewal and is subject to an AMR. The ductwork is included in LRA Table 2.3.3-7 and is evaluated under the component group "doors, closure bolts, equip frames (including dampers, duct, housings and silencers)."

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.7-1 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.7-1 resolved.

RAI 2.3.3.7-2. The Dresden and Quad Cities ventilation systems that support use of the safe shutdown controls have not been included as part of the scoping and screening process. The staff asked the applicant to state whether the ventilation systems used to support the safe shutdown controls are within the scope of license renewal and subject to an AMR in accordance with 10CFR54.4(a)(1) and (a)(2). If they are within scope, the applicant should provide the relevant information about the components to enable the staff to complete its review of the AMR result tables in the LRA. If the ventilation systems used to support the safe shutdown controls are not in the scope of license renewal and subject to an AMR, provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.7-2 states that safe shutdown of the Dresden and Quad Cities plants from outside the control room is discussed in Dresden UFSAR Section 7.4.2 and Quad Cities Section 7.4.2. Neither Dresden nor Quad Cities has a dedicated safe shutdown control panel. Consequently, there is no ventilation system that specifically supports safe shutdown controls. Each station has procedures for control room evacuation that provide operator actions to be taken at various instrument and control panels located throughout the plants. The ventilation systems that serve the areas where safe shutdown equipment is located were included in the scoping and screening evaluation process. However, the Dresden and Quad Cities current licensing bases do not require that a radiological accident be postulated concurrent with a control room fire and they do not credit ventilation systems with maintaining habitability for local operation of safe shutdown equipment during an event that requires the control room to be evacuated.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.7-2 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.7-2 resolved.

2.3.3.7.3 Conclusions

The staff reviewed LRA Section 2.3.3.4, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the CRV-HVAC system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the CRV-HVAC system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.8 HVAC—Reactor Building

2.3.3.8.1 Summary of Technical Information in the Application

The applicant described the reactor building HVAC (RBH-HVAC) system in LRA Section 2.3.3.8 and provided a list of components subject to an AMR in LRA Table 2.3.3-8.

The RBH-HVAC system has the functions to—provide conditioned air to the reactor building and primary containment structures, and remove the heat remaining from the primary process and operating equipment; minimize the level of airborne contaminants; make the plant atmosphere adequate to support the presence of personnel; maintain the reactor building at a negative pressure to minimize the release of radioactive contaminants to the environment; maintain a differential pressure of at least 0.25 in. water between clean and potentially contaminated areas; and remove exhaust air from the drywell and suppression chamber purge system when the reactor is shutdown and/or whenever primary containment access is required.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following RBH-HVAC system intended functions:

- support ESF function(s)—provides instrumentation to trip automatically on a secondary containment isolation signal
- containment isolation—isolation dampers help ensure that adequate secondary containment is maintained during and after an accident by minimizing potential paths to the environment
- credited in regulated event(s)—fire dampers provide isolation to prevent spread of a fire credited in mitigation of the Appendix R fire
- flow path (Dresden only)—conducts effluent directly to the reactor building stack or the standby gas treatment system
- pressure control (Dresden only)—maintains a negative pressure of at least 0.25 in. water between the reactor building and the environment
- radioactivity control—(Dresden only) collects radioactivity released from a fuel handling accident in the openings located on the periphery of the refueling pools, and provide timely removal to the reactor building exhaust plenum providing sufficient level to isolate secondary containment

The RBH-HVAC system operation provides general building ventilation. Using supply fans, outside air is drawn into the RBH-HVAC system, and filtered, tempered, and discharged into the supply system ducts. The supply air ducts distribute air throughout the building via air registers. The system also uses two emergency isolation dampers in series in the main supply duct upstream of all branch ducts. The exhaust fans draw building air into exhaust vents located throughout the building and discharge it through the reactor building vent stack. The normal ventilation exhaust duct for the spent fuel, reactor cavity, and dryer/separator pool area is arranged to take suction through multiple inlets around the periphery of the pools above the water line. Two emergency isolation dampers are installed in series in the main exhaust duct upstream of the exhaust fan air intake and downstream of any branch connections to the exhaust duct. The reactor building ventilation system also removes exhaust air from the drywell and suppression chamber purge system when the reactor is shut down for maintenance or whenever primary containment access is required.

In LRA Section 2.3.3.8, the applicant described the RBH-HVAC system evaluation boundary. In addition, the applicant highlighted those portions of the RBH-HVAC system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.8. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the RBH-HVAC system in LRA Table 2.3.3-8 as being within the scope of license renewal and subject to an AMR:

- debris screens (filter, Dresden only)
- doors, closure bolts, and equip frames including dampers, duct, housings, and silencers (pressure boundary)
- duct fittings, hinges, and latches (pressure boundary)
- filters/strainers (pressure boundary, Dresden only)
- flex collars, doors and damper seals (pressure boundary, Dresden only)
- housing supports (pressure boundary, Dresden only)
- piping and fittings (pressure boundary, Dresden only)
- seals (pressure boundary, Dresden only)
- tubing (pressure boundary)
- valves, including dampers (pressure boundary, Dresden only)

2.3.3.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.8, Dresden UFSAR Sections 6.2.3, 9.4.2, 9.4.5, and 9.4.7, and Quad Cities UFSAR Sections 6.2.3, 9.4.2, 9.4.5, and 9.4.7 to determine whether there is reasonable assurance that the RBH-HVAC system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the RBH-HVAC system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the RBH-HVAC system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the RBH-HVAC system. The staff then reviewed the referenced P&I drawings to verify that: those portions of the RBH-HVAC system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.8 and that the applicant identified all RBH-HVAC system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the RBH-HVAC system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.8 and that the RBH-HVAC system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-8. The staff did not identify any omissions.

2.3.3.8.3 Conclusions

The staff reviewed LRA Section 2.3.3.8 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the RBH-HVAC systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the RBH-HVAC systems that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.9 Emergency Core Cooling System (ECCS) Corner Room HVAC

2.3.3.9.1 Summary of Technical Information in the Application

The applicant described the ECCS corner room (ECR-HVAC) system in LRA Section 2.3.3.9 and provided a list of components subject to an AMR in LRA Table 2.3.3-9.

The purpose of the ECR-HVAC system room coolers is to maintain the compartment temperature below the qualification temperature of the components that are required for safe shutdown of the plant. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following additional intended functions of the ECR-HVAC system:

- environmental control—provides ventilation to maintain an acceptable environment to support proper ECCS pump operation during normal plant operating conditions and following design basis events

- credited in regulated event(s) (Dresden)—the system contains components that are relied upon to demonstrate compliance with 10 CFR 50.49 (EQ)

- credited in regulated event(s) (Quad Cities)—provides ventilation and cooling credited in mitigation of the Appendix R fire (The system also contains components that are relied upon to demonstrate compliance with 10 CFR 50.49 (EQ))

Each of the ECCS corner rooms has an ECR-HVAC system which contains a water-cooled heat exchanger and a fan unit. At Dresden, the ECR system includes the HPCI and LPCI room coolers. The core spray pumps are located in the LPCI rooms. There are two LPCI room coolers and one HPCI room cooler per unit. During normal plant operating conditions, the cooling water for the room coolers is provided by the SW system. The CCSW system provides backup cooling water to all three room coolers. At Quad Cities, the ECR-HVAC system includes one HPCI, two core spray pumps, and two RHR room coolers per unit. The Quad Cities Unit 1 and Unit 2 diesel generator cooling water pumps (evaluated with the diesel generator service water system) provide cooling water to the room coolers in their respective units. The SW system can also provide a non-safety-related alternate supply of cooling water to the HPCI room emergency coolers.

In LRA Section 2.3.3.9, the applicant described the ECR-HVAC system evaluation boundary. In addition, the applicant highlighted those portions of the ECR-HVAC system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.9. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the ECR-HVAC system in LRA Table 2.3.3-9 as being within the scope of license renewal and subject to an AMR:

- air handlers heating/cooling (pressure boundary)
- air handlers heating/cooling (heat transfer)
- ducts, fittings, access doors, closure bolts, and equipment frames (pressure boundary)

2.3.3.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.9, Dresden UFSAR Sections 9.2.1, 9.2.2, and 9.4.6, and Quad Cities UFSAR Sections 6.3.2, 9.2.2, and 9.5.5 to determine whether there is reasonable assurance that the ECR system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified as an intended function of the ECR-HVAC system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the ECR-HVAC system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and

10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the ECR-HVAC system. The staff then reviewed the referenced P&I drawings to verify that: those portions of the ECR-HVAC system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.9 and that the applicant identified all ECR-HVAC system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.9 identified one area in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued an RAI to the applicant concerning a specific item needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAI and the applicant's responses by letter, dated October 3, 2003, are described below.

<u>RAI 2.3.3.9-1</u>. The ECR-HVAC system Table 2.3.3-9 that identifies component groups requiring AMR has not included the following in the scope of license renewal—flexible collars, damper or door gaskets, seals, or other soft parts. These types of components were included in the other HVAC systems. State whether these identified components are subject to an AMR and provide the relevant information within Table 2.3.3-9 to enable the staff to complete the license renewal review process. If these components are not subject to an AMR, provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.9-1 states that the ECR-HVAC system consists of room coolers that contain a cooling coil, a fan, and a housing. There is no ductwork attached to the cooler. There are no flexible collars, damper or door gaskets, seals, or other soft parts associated with the ECR-HVAC system.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.9-1 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.9-1 resolved.

2.3.3.9.3 Conclusions

The staff reviewed LRA Section 2.3.3.9, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the ECR-HVAC system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the ECR-HVAC system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.10 Station Blackout Building HVAC

2.3.3.10.1 Summary of Technical Information in the Application

The applicant described the station blackout building HVAC (SBO-HVAC) system in LRA Section 2.3.3.10 and provided a list of components subject to an AMR in LRA Table 2.3.3-10.

The SBO-HVAC system has the functions to—maintain the SBO diesel generator and support equipment ambient temperatures within an acceptable range for diesel readiness, provide annunciation of temperature abnormalities, react to fire alarm actuation, and remove hydrogen gas and diesel fumes from the building. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following SBO-HVAC system intended functions:

- environmental control—supports the SBO diesel generators in providing AC power during a loss of offsite power and station blackout by supplying the necessary HVAC to required SBO diesel generators and auxiliaries

- credited in regulated event(s)—system functions to prevent the spread of a fire credited in mitigation of the Appendix R fire (Quad Cities only)

Operation of the SBO-HVAC system provides heating and ventilation for the SBO diesel generator rooms, the electrical equipment rooms, and the battery rooms. The ventilation system for each diesel generator is capable of maintaining the design room conditions with the diesel generators running at full load and maintaining design room conditions in winter with the SBO diesel generators in the standby mode. The ventilation system for each electrical equipment room is capable of maintaining the design room conditions with the diesel generators running at full load. The heating systems for these rooms maintain room conditions in winter. The ventilation systems for the battery rooms have an air-cooled condensing unit, an air handling unit and an electric heater capable of maintaining the battery room at nominal design conditions. The exhaust fans in the battery rooms and the day tank rooms are interlocked with the fire system to shut down on fire alarm actuation.

In LRA Section 2.3.3.10, the applicant described the SBO-HVAC system evaluation boundary. In addition, the applicant highlighted those portions of the SBO-HVAC system and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.10. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the SBO-HVAC system in LRA Table 2.3.3-10 as being within the scope of license renewal and subject to an AMR:

- diesel generator building HVAC (DGB-HVAC) air handlers heating/cooling (pressure boundary, Quad Cities)
- DGB HVAC air handlers heating/cooling (heat transfer, Quad Cities)
- debris screens (filter)
- doors, closure bolts, and equip frames (pressure boundary)
- duct fittings, hinges, and latches (pressure boundary)
- flex collars, doors and damper seals (pressure boundary)
- flow elements (pressure boundary, Dresden only)
- tubing (pressure boundary)

2.3.3.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.10, Dresden UFSAR Section 9.5.9, and Quad Cities UFSAR Section 8.3.1.9 to determine whether there is reasonable assurance that the SBO-HVAC system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the SBO-HVAC system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the SBO-HVAC system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the SBO-HVAC system. The staff then reviewed the referenced P&I drawings to verify that those portions of the SBO-HVAC system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.10 and that the applicant identified all SBO-HVAC system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.10 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning specific items needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.10-1. The standby blackout building ventilation fan housings are highlighted on the ventilation flow diagrams identified in the LRA as within scope of license renewal. While ventilation fan housings are highlighted as within the scope of license renewal, ventilation fan housings are not identified in LRA Table 2.3.3-10 that identify component groups requiring AMR. The applicant should state whether the standby blackout building ventilation fan housings are within the scope of license renewal and subject to an AMR. If so, the applicant should provide the relevant information about the components in order to provide the staff with the ability to complete Table 2.3.3-10 of the LRA. If the standby blackout building ventilation fan housings are not in scope or subject to an AMR, provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.10-1 states that the SBO ventilation fan housings highlighted on boundary diagrams LR-DRE-M-4356-1, -2, -3, -4, and -5, and LR-QDC-M-3033-1 and -2 for the SBO-HVAC system are within the scope of license renewal and subject to an AMR. These ventilation fan housings were evaluated under the component group of "doors, closure bolts, equip frames" in LRA Table 2.3.3-10.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.10-1 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.10-1 resolved.

RAI 2.3.3.10-2. The Dresden and Quad Cities ventilation systems used to support fuel handling have not been included as part of the scoping and screening process. The applicant should state whether the ventilation systems used to support fuel handling are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a)(1) and (a)(2). If so, the applicant should provide the relevant information about the components to enable the staff to complete its review of the application. If the ventilation systems used to support fuel handling are not in the scope of license renewal and subject to an AMR, provide justification for their exclusion.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.10-2 states that Dresden UFSAR Section 15.7.3.4.3.2, Airborne Effects Over the Drywell Head Cavity, addresses airborne effects associated with design basis fuel handling accidents and states the following:

> If the noble gases are released within a couple of feet of the peripheral exhaust ducts, this activity would be removed within a short period of time to the reactor building exhaust plenum header. The radiation level in the exhaust duct would be sufficient to isolate secondary containment.

The Dresden UFSAR statement credits the radiation monitors in the reactor building ventilation system for isolating the system and preventing further release of noble gas to the environment. This requires the reactor building ventilation system to transport the noble gases released from a fuel handling accident to the radiation monitors to isolate the system. The above statement was the basis for inclusion of the entire reactor building ventilation system for Dresden in the scope of license renewal. The Quad Cities UFSAR contains a similar fuel handling accident scenario. However, the Quad Cities analysis does not credit the reactor building ventilation radiation monitors for isolating the ventilation system. Rather, the analysis credits the radiation monitors on the refueling floor for initiating the signal that isolates the reactor building ventilation. UFSAR Section 15.7.2.5.3, Chimney Release Rate, addresses chimney release rates associated with design basis fuel handling accidents and states the following:

> The standby gas treatment system is actuated automatically on high area radiation in the reactor building in order to control the release of fission products to the atmosphere. Monitors are located near the fuel pool, and the SBGTS would be initiated prior to the escape of fission products through the regular ventilation system.

The refueling floor radiation monitors are relied upon for actuation of the SBGTS (and secondary containment isolation) for the Quad Cities fuel handling accident. Despite the fact that radiation monitors are contained in the Quad Cities reactor building ventilation system ductwork, no mention is made of these monitors in the UFSAR for this DBA. Consequently, a determination was made not to include system components other than the isolation dampers (and selected fire dampers) in the scope of license renewal.

However, further consideration of the ventilation ducting leads to the conclusion that exhaust dampers and fan configuration relative to the ventilation exhaust radiation monitors do provide a basis for adding parts of the Quad Cities ventilation ducting within the scope of license renewal. The function of the radiation monitors in the exhaust duct is to ensure that excessive radiation is not released. This is done by isolating the secondary containment when the radiation level in the building effluent is above the monitors' set point. Appropriate monitoring of all reactor building effluent is ensured by (1) maintaining the building at a slightly negative pressure relative to atmosphere, (2) monitoring the building ventilation effluent upstream of the exhaust dampers, and (3) tripping the fans and closing the intake and exhaust dampers if the permissible effluent radiation level is exceeded or if the negative pressure on the building is not maintained. The ducting between the reactor building-to-turbine building interface and the reactor building ventilation exhaust dampers must remain intact in order to ensure that all reactor building effluent is properly monitored and that there is no potential exhaust path that bypasses the radiation monitors. As such, this additional Quad Cities ventilation ductwork is included within the scope of license renewal and will receive the same aging management as the other ductwork included within the scope.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.10-2 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.10-2 resolved.

2.3.3.10.3 Conclusions

The staff reviewed LRA Section 2.3.3.10 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the SBO-HVAC systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the SBO-HVAC system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.11 Station Blackout System (Diesel and Auxiliaries)

2.3.3.11.1 Summary of Technical Information in the Application

The applicant described the station blackout (SBO) system in LRA Section 2.3.3.11 and provided a list of components subject to an AMR in LRA Table 2.3.3-11.

The SBO system is a non-safety-related system which functions to provide an independent source of additional on-site AC power as a backup to the EDGs. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following SBO system intended functions:

- credited in regulated event(s)—provides an alternate source of AC electrical power to plant equipment in the event of a station blackout (10 CFR 50.63)

- credited in regulated event(s)—provides an alternate power source credited in mitigation of the Appendix R fire (Quad Cities only)

The system consists of two diesel generator (DG) sets. Each SBO DG set is an assembly consisting of two diesel engines and a generator arranged in tandem, and their associated support systems. Each SBO DG set is located in a separate DG room. The support systems included in the SBO system evaluation boundary are the SBO DG engine jacket water system, SBO DG engine exhaust/combustion air system, SBO DG engine air start system, SBO DG engine lube oil system, and SBO DG fuel oil system.

In LRA Section 2.3.3.11, the applicant described the evaluation boundary for the SBO system. In addition, the applicant highlighted those portions of the SBO system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.11. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the SBO system in LRA Table 2.3.3-11 as being within the scope of license renewal and subject to an AMR:

- air accumulator vessels (pressure boundary)
- closure bolting (pressure boundary)
- filters/strainers (pressure boundary)
- filters/strainers, including separators (pressure boundary)
- flexible hoses (pressure boundary)
- flow elements (pressure boundary)
- heat exchangers, including coolers and heat exchangers (pressure boundary)
- heat exchangers, including coolers and heat exchangers (heat transfer)
- lubricators (pressure boundary)
- mufflers (pressure boundary)
- piping and fittings, including heaters, orifices, and thermowells (pressure boundary)
- piping and fittings, including restricting orifices (pressure boundary)
- pumps (pressure boundary)
- pumps (throttle, Dresden only)
- restricting orifices (pressure boundary)
- restricting orifices (throttle)
- sight glasses (pressure boundary)
- tanks (pressure boundary)
- thermowells (pressure boundary)
- tubing (pressure boundary)
- turbochargers (pressure boundary)
- valves (pressure boundary)

2.3.3.11.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.11, Dresden UFSAR Section 9.5.9, and Quad Cities UFSAR Section 8.3.1.9 to determine whether there is reasonable assurance that the SBO system components, within the scope of license renewal and subject to an AMR, have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the SBO system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the SBO system that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the SBO system. The staff then reviewed the referenced P&I drawings to verify that those portions of the SBO system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.11 and that the applicant identified all SBO system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the SBO system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.11 and that the SBO system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-11. The staff did not identify any omissions.

2.3.3.11.3 Conclusions

The staff reviewed LRA Section 2.3.3.11 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the SBO system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SBO system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.12 Diesel Generator Cooling Water System

2.3.3.12.1 Summary of Technical Information in the Application

The applicant described the diesel generator cooling water (DGCW) system in LRA Section 2.3.3.12 and provided a list of components subject to an AMR in LRA Table 2.3.3-12.

The primary function of the DGCW system is to provide cooling water to the EDGs. In addition, at Quad Cities, the DGCW system provides cooling water to the ECCS room coolers to ensure the proper environment for ECCS pump operation. Also, at Dresden, the DGCW system provides an alternate water supply for the CCSW keep fill system.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following DGCW system intended functions:

- supports emergency supply of AC power—provides cooling water to emergency diesel generator heat exchangers and engine jacket cooling

- support ESF function(s) (Quad Cities only)—provides cooling water to ECCS room coolers to ensure proper environment for ECCS pump operation

- provides structural support—non-safety-related portions of this system provide structural support to attached safety-related piping

- credited in regulated event(s)—provides cooling water to safe shutdown equipment credited in mitigation of the Appendix R fire

At Dresden, three motor driven submersible pumps take suction in the cribhouse and provide cooling water to the DGCW heat exchangers. The DGCW return water is then routed back to the SW discharge pipe. A cross-tie connection piping is provided between the DGCW systems of Unit 2 and Unit 3. The DGCW pumps may also be used as the alternate safety-related water supply to the CCSW keep fill system which is normally supplied by SW system.

At Quad Cities, the DGCW pumps take suction from the RHR SW inlet header. These pumps provide cooling water to the EDG heat exchangers and to the room coolers of the HPCI room, the RHR rooms, the CS rooms, and the diesel generator cooling water pump cubicle, and ultimately discharge into the SW discharge pipe.

The applicant described the evaluation boundary for the DGCW system in LRA Section 2.3.3.12. In addition, the applicant highlighted those portions of the DGCW system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.12. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the DGCW system in LRA Table 2.3.3-12 as being within the scope of license renewal and subject to an AMR:

- DGB-HVAC air handlers heating/cooling, including DGCW pump cubicle coolers (pressure boundary, Quad Cities only)

- DGB-HVAC air handlers heating/cooling, including DGCW pump cubicle coolers (heat transfer, Quad Cities only)

- closure bolting (pressure boundary)

- doors, closure bolts, and equipment frames (pressure boundary, Quad Cities only)

- non-safety-related (NSR) vents or drains, piping, and valves (structural integrity/attached support)

- orifice bodies (pressure boundary)
- orifice bodies (throttle)
- orifice bodies (structural integrity/attached support, Quad Cities)
- piping and fittings, including flow elements (pressure boundary)
- piping and fittings (structural integrity/attached support)
- pulsation dampeners (structural integrity/attached support, Quad Cities)
- pumps (pressure boundary)
- strainer bodies (pressure boundary, Dresden only)
- strainer screens (filter, Dresden only)
- thermowells (pressure boundary)
- tubing (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached support)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of non-safety-related sections of the DGCW system at Quad Cities were expanded and highlighted as shown on the revised boundary diagrams and an additional new boundary diagram. Additional piping and components, including a gland seal water tank, piping, valves, and associated instrumentation, from the DGCW system at Quad Cities were added to the scope of license renewal. The applicant stated that the DGCW system did not require a boundary expansion at Dresden because of a different diesel cooling water pump design that does not require gland seal water.

The applicant identified the following additional component groups and their intended functions within the DGCW system as being within the scope of license renewal, and added them to LRA Table 2.3.3-12 being subject to an AMR:

- tanks (spatial interaction, Quad Cities only)
- valves (spatial interaction)
- piping and fittings (spatial interaction)

2.3.3.12.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.12, Dresden UFSAR Sections 7.4.2 and 9.5.5, and Quad Cities UFSAR Sections 3.4.1.2, 6.3.2, and 9.5.5 to determine whether there is reasonable assurance that the DGCW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the DGCW system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the DGCW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the DGCW system. The staff then reviewed the referenced P&I drawings to verify that those portions of the DGCW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.12 and that the applicant identified all DGCW system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the DGCW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.12. The DGCW system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-12. The staff did not identify any omissions.

2.3.3.12.3 Conclusions

The staff reviewed LRA Section 2.3.3.12 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the DGCW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the DGCW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.13 Diesel Fuel Oil System

2.3.3.13.1 Summary of Technical Information in the Application

The applicant described the diesel fuel oil (DFO) system in LRA Section 2.3.3.13 and provided a list of components subject to an AMR in LRA Table 2.3.3-13.

The function of the DFO system is to store and supply DFO for the EDGs, the SBO DGs, the diesel fire pumps, and (at Dresden only) the isolation condenser makeup pump diesels. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following DFO system intended functions:

- support ESF function(s)—stores and provides a source of clean diesel fuel oil to the emergency diesel generators which supply on-site AC power to ESF systems
- credited in regulated events—stores and provides oil to the diesel fire pump (10 CFR 50.48) and the isolation condenser system (at Dresden only) diesel
- preclude adverse effects on safety-related SSCs-maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

A separate fuel oil storage and transfer system, consisting of tanks, pumps, filters, strainers, and associated piping, valves, and instrumentation and controls, is provided for each EDG. Each storage and transfer system includes a fuel oil storage tank and a fuel oil day tank. Fuel is transferred from the fuel oil storage tank to the fuel oil day tank by the diesel fuel oil transfer pump. Transfer is accomplished automatically by level switches on the day tank. Fuel oil from the fuel oil day tank is drawn through the engine-driven fuel oil pump and discharged through the duplex fuel oil filter and on to the diesel engine injectors. Any excess fuel is returned to the fuel oil day tank. At Dresden, the Unit 2 EDG fuel oil transfer system also supplies fuel oil to the isolation condenser makeup pump fuel oil day tanks and the Unit 3 EDG fuel oil transfer system also supplies fuel oil to the Unit 2/3 diesel fire pump day tank. At Quad Cities, the Unit 1 and Unit 2 EDG fuel oil transfer systems also supply fuel oil for the diesel fire pump day tanks.

The applicant described the evaluation boundary for the DFO system in LRA Section 2.3.3.13. In addition, the applicant highlighted those portions of the DFO system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.13. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the DFO system in LRA Table 2.3.3-13 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- filters/strainers (pressure boundary)
- filters/strainers (filter)
- flame arrestors (fire barrier)
- piping and fittings (pressure boundary)
- piping and fittings (structural integrity/attached support)
- pumps (pressure boundary)
- restricting orifices (pressure boundary, Quad Cities only)
- tubing (pressure boundary)
- sight glasses (pressure boundary)
- tanks (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached support)

2.3.3.13.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.13, Dresden UFSAR Section 9.5.4, and Quad Cities UFSAR Section 9.5.4 to determine whether there is reasonable assurance that the DFO system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the DFO system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the DFO system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the DFO system. The staff then reviewed the referenced P&I drawings to verify that those portions of the DFO system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.13 and that the applicant identified all DFO system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the DFO system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.13. The DFO system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-13. The staff did not identify any omissions.

2.3.3.13.3 Conclusions

The staff reviewed LRA Section 2.3.3.13 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the DFO system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the DFO system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.14 Process Sampling System

2.3.3.14.1 Summary of Technical Information in the Application

The applicant described the process sampling system in LRA Section 2.3.3.14 and provided a list of components subject to an AMR in LRA Table 2.3.3-14.

The process sampling systems/subsystems are used to monitor process parameters from various systems. Samples are taken and analyzed on a continuous and/or laboratory basis. Selected parameters are recorded and/or alarmed. At Dresden, the process sampling systems include nitrogen inerting and drywell oxygen sampling, turbine building and radwaste air particulate sampling, drywell air particulate sampling, and off-gas building air particulate sampling. At Quad Cities, the process sampling systems include drywell oxygen analysis, drywell air particulate, and turbine building particulate sampling. Sample lines that penetrate the primary containment are provided with isolation valves.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following intended process sampling system function:

- primary containment isolation—provides isolation of air sampling system piping penetrating primary containment

At Dresden, the evaluation boundary includes the process sampling systems for nitrogen inerting and drywell oxygen sampling, drywell air particulate sampling, turbine building and radwaste air particulate sampling, and off-gas building air particulate sampling. At Quad Cities, the evaluation boundary includes the process sampling systems for drywell oxygen analysis, drywell air particulate, turbine building particulate sampling, and off-gas filter building continuous air monitor.

In LRA Section 2.3.3.14, the applicant described the evaluation boundary of the process sampling system. In addition, the applicant highlighted those portions of the system and its structures and components that are within the scope of the Rule in the P&I drawings listed as reference in LRA Section 2.3.3.14. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the process sampling system in LRA Table 2.3.3-14 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- NSR vents or drains, piping and valves (structure integrity/attached support, Quad Cities only)
- piping and fittings (structure integrity/attached support, Quad Cities only)
- piping and fittings (pressure boundary, Quad Cities only)
- tubing (pressure boundary)
- valves (pressure boundary)

- valves (leakage boundary spatial interaction, Quad Cities only)
- valves (structure integrity/attached support,) (Quad Cities only)

2.3.3.14.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.14, and Dresden UFSAR Sections 1.2.2.4, 5.2.5.6.1, 6.2.1, 7.3.2, and 9.3.2 and Quad Cities UFSAR Sections 1.2, 5.2, 6.2, 7.3, and 9.3.2 to determine whether there is reasonable assurance that the process sampling system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the process sampling system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the process sampling system that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the process sampling system. The staff then reviewed the referenced P&I drawings to verify that those portions of the process sampling system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.14 and that the applicant identified all process sampling system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.14 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant responses, dated October 3, 2003, are described below.

RAI 2.3.3.14-1. Line 1-1655-2"-L is shown on process sampling (PS) diagram LR-QDC-461-1 (E-5) requiring AMR and extends to drawing M-34-1 (C-6). The LR interface for AMR between PS and other systems for this line is not shown on drawing M-34-1. Similarly line 2-1655-2"-L is shown on PS diagram LR-QDC-M-463-1 (C-3) and extends to drawing M-76-1 (C-5). The LR interface for AMR between PS and other systems for this line is not shown on drawing M-76-1. The staff asked the applicant to identify the boundary for these lines between PS and other systems and where the LRA addresses the AMR of these components, or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.14-1 stated that piping and piping components shown on boundary diagram LR-QDC-M-461-1, highlighted in green, fall within the scope of license renewal and require aging management. Piping shown on boundary diagram LR-QDC-M-461-1 at coordinate E-5 (includes valves 1-8803 and 1-8804) was evaluated with the PC system. Boundary diagram LR-QDC-461-1 should have included the LR boundary flag for the PC system at valve 1-8803. Remaining portions of pipe highlighted in green on boundary diagram LR-QDC-M-461-1, were evaluated with either the process sampling or primary containment systems as shown by the LR interface boundary flag on the boundary diagram.

Piping and piping components shown on boundary diagram LR-QDC-M-463-1, highlighted in green, fall within the scope of license renewal and require aging management. Piping on boundary diagram LR-QDC-M-463-1 at coordinate C-2 (includes valves 2-8803 and 2-8804) was evaluated with the PC system. Boundary diagram LR-QDC-463-1 should have included the LR boundary flag for the PC system at valve 2-8803. Remaining portions of pipe, highlighted in green on boundary diagram LR-QDC-M-463-1, were evaluated with either the process sampling or primary containment systems as shown by the LR interface boundary flag on the drawing.

LRA Table 2.3.2-3 includes those components evaluated within the PC system boundary and provides the appropriate aging management reference for each component group. LRA Table 2.3.3-14 includes those components evaluated within the process sampling system boundary and provides the appropriate aging management reference for each component group. Boundary diagrams LR-QDC-M-461-1 and LR-QDC-463-1 should have included the appropriate system boundary flags.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.14-1 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.14-1 resolved.

RAI 2.3.3.14-2. Line 2-9224 on drawing LR-DRE-M-178 (E-6) and line 3-9224 on drawing LR-DRE-M-421 (C-6) requiring AMR shows coming from main steam tunnel but no drawing number and coordinates of main steam tunnel are given for these lines. Similarly line 2-9203 on drawing LRE-DRE-M-178 (F-6) and line 3-9203 on drawing LRE-DRE-M-421 (C-9) requiring AMR shows coming from drawings M-25 and M-356 but no coordinates of M-25 and M-356 are given for these lines. The staff asked the applicant to identify the above drawing numbers and coordinates for lines 2-9224, 3-9224, 2-9203, and 3-9204. The staff also asked the applicant to identify the boundary break between PS and other systems for these lines and associated valves and where the LRA addresses the AMR of these components, or provide a justification for excluding these component from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.14-2 stated that as shown on boundary diagrams LR-DRE-M-178 and LR-DRE-M-421, the PS system piping and tubing highlighted in green is safety-related and provides a pressure retaining function. This piping and tubing is evaluated with the PS system and is in the scope of license renewal requiring AMR. The piping is skid mounted (rigid) and was provided by the vendor. Piping and piping components beyond the safety-related PS system boundary (colored in black) are evaluated with the PS system and are outside the scope of license renewal.

On boundary diagram LR-DRE-M-178 (E-6 and F-6), line 2-9224-1/2"-T is air sample tubing and line 2-9203-1/2"-AK is air sample piping that are not connected to the process piping and do not continue from any other boundary diagram. The arrow shown on boundary diagram LR-DRE-M-178 (that includes valves 2-8507-523, 2-8599-652, 2-8507-501, and 2-8599-630) indicates that the piping comes from the main steam tunnel and drywell. The piping is open to the atmosphere to draw air samples from the area.

LRA Section 2.3.3.14, Table 2.3.3-14, includes components evaluated within the PS system boundary and provides the appropriate aging management reference for each component group. The components within the scope of license renewal are evaluated for AMR as follows:

- AMR for the valves is addressed in aging management references 3.3.2.23, 3.3.2.40, 3.3.2.264, and 3.3.2.295.
- AMR for tubing is addressed in aging management references 3.3.2.42, 3.3.2.254, 3.3.2.34, and 3.3.2.244.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.14-2 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.14-2 resolved.

2.3.3.14.3 Conclusions

The staff reviewed LRA Section 2.3.3.14, accompanying scoping boundary drawings and the applicant's response to RAIs dated October 3, 2003, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the process sampling system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the process sampling system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.15 Carbon Dioxide System

2.3.3.15.1 Summary of Technical Information in the Application

The applicant described the carbon dioxide (CO_2) system in LRA Section 2.3.3.15 and provided a list of component groups subject to an AMR in LRA Table 2.3.3.15. The CO_2 system provides fire suppression for three emergency diesel generator rooms, the two alternator exciters in the main generator housings, and, at Dresden only, the auxiliary equipment room. The system also provides for generator purging.

2.3.3.15.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.15 and referenced LRA boundary drawings to determine whether there is reasonable assurance that the CO_2 system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that were required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

In a letter dated August 4, 2003, the staff requested that the applicant clarify the boundary of the in-scope portions of the system to verify that the discharge nozzles are included or to justify their exclusion (RAI 2.3.3.15-1a). In a letter dated October 3, 2003, the applicant responded that the CO_2 discharge nozzles for Dresden are included within the scope of license renewal and are subject to the same AMR as the Quad Cities CO_2 discharge nozzles. The CO_2 discharge nozzles are addressed in LRA Table 2.3.3-15 under the component group "piping and fittings." Aging management reference 3.3.1.5 addresses the aging management of the external surface of the carbon steel CO_2 discharge nozzles. Aging management reference 3.3.2.138 addresses the aging management of the internal surface of the CO_2 discharge nozzles. LRA boundary drawing, LR—DRE-M-42 should have highlighted the CO_2 fire suppression system discharge nozzles indicating that they were within the scope of license renewal. The staff finds the applicant's response acceptable as it clarifies the components within the scope of license renewal.

In a letter dated August 4, 2003, the staff also requested that the applicant clarify which components of these systems are addressed in the references in LRA Table 2.3.3.15 and Table 3.3.1 (RAI 2.3.3.15-1b). In a letter dated October 3, 2003, the applicant responded that the CO_2 storage tank, valves, and other components fall within the scope of license renewal and are subject to an AMR. They are included under component groups "piping and fittings," "tanks," "tubing," and "valves" in LRA Table 2.3.3.15. The external surface of these components is evaluated in aging management reference 3.3.1.5 and the internal surfaces are evaluated in aging management references 3.3.2.138, 3.3.2.212, 3.3.2.234, 3.3.2.260, and 3.3.2.268. The staff finds the response provided by the applicant acceptable as it clarifies which components are specifically referred to by reference 3.3.1.5.

LRA boundary drawing LR-QDC-M-30-3 does not show the 7.5 ton CO_2 tank as within the scope of license renewal. This is inconsistent with LRA boundary drawing LR-DRE-M-42. The staff believes that the CO_2 storage tank should be within the scope of license renewal and subject to an AMR. In a letter dated August 4, 2003, the applicant was asked to clarify whether the CO_2 storage tank at Quad Cities is in scope and subject to an AMR or provide justification for its exclusion (RAI 2.3.3.15-1b). In a letter dated October 3, 2003, the applicant responded that the 7.5 ton CO_2 tank falls within the scope of license renewal. LRA boundary drawing LR-QDC-M-30-3 should have highlighted the 7.5 ton CO_2 tank as within the scope of license renewal. These tanks are addressed in LRA Table 2.3.3-15 under the component group "tanks." Aging management reference 3.3.1.5 addresses the aging management of the external surface of the carbon steel CO_2 tanks and aging management reference 3.3.2.212 addresses the aging management of the internal surface. The staff finds the applicant's response acceptable on the basis that it clarifies that the 7.5 ton CO_2 tank is within the scope of license renewal and subject to an AMR.

2.3.3.15.3 Conclusions

The staff reviewed LRA Section 2.3.3.15 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the CO_2 fire suppression system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the CO_2 fire suppression system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.16 Service Water System

2.3.3.16.1 Summary of Technical Information in the Application

The applicant describes the service water (SW) system in LRA Section 2.3.3.16 and provides a list of components subject to an AMR in LRA Table 2.3.3-16.

The function of the SW system is to provide strained river water to cool various loads in the reactor building, turbine building, and auxiliary building during plant normal operation. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following SW system intended functions:

- preclude adverse effects on safety-related SSCS's—maintains sufficient integrity of non-safety-related components that could spatially interact and be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

- structural support—non-safety-related portions of this system provide structural support to attached safety-related piping (Quad Cities only)

- pressure boundary—maintain pressure boundary of the CCSW keep fill line (Dresden only)

- support ESF function(s)—provides cooling water to ECCS room coolers to ensure proper environment for ECCS pump operation (Dresden only)

- credited in regulated event(s)—provides cooling water to safe shutdown equipment credited in mitigation of the Appendix R fire (Dresden only)

- emergency makeup—provides an alternate supply of water for makeup to the isolation condenser (Dresden only)

- plant component cooling—provide strained cooling water to the RBCCW (Dresden only)

The SW system has five pumps, three strainers, and a common distribution header. Two SW pumps are provided per unit, and the fifth shared pump is used as a backup. The system is cross connected between the units. The majority of the loads are heat exchangers, coolers, and condensers.

The SW system provides cooling to the heat exchangers, turbine building closed cooling water heat exchangers, traveling screen wash spray, fire protection system, turbine oil coolers, reactor recirculation pump motor generator (M-G) set oil coolers, generator hydrogen coolers, generator stator water coolers, standby coolant supply, control room air conditioning condensers, auxiliary electric equipment room air conditioning condenser (Dresden only), off-gas glycol chillers, X-area (Dresden)/MSIV room (Quad Cities) coolers (steam tunnel coolers), off-gas filter building sample system heat exchanger, and control rod drive pump coolers (Dresden only, and only as a backup to turbine building closed cooling water heat exchangers).

The applicant described the evaluation boundary of the SW system in LRA Section 2.3.3.16. In addition, the applicant highlighted those portions of the SW system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.16. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the component groups and their intended functions within the SW system in LRA Table 2.3.3-16 as being within the scope of license renewal and subject to an AMR.

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1 and clarified in a letter, dated June 22, 2004, the applicant expanded the system boundaries for the SW system at both Dresden and Quad Cities due to the potential for spatial interaction with safety-related components. The applicant included all of the SW components shown on revised boundary diagrams LR-QDC-M-22-4, LR-QDC-M-22-5, LR-QDC-M-69-4, LR-QDC-M-69-5, LR-DRE-M-22, LR-DRE-M-355 within the scope of license renewal. The applicant included in the scope additional service water piping components shown on revised boundary diagrams LR-QDC-M-69-1 and LR-QDC-M-22-1 and new boundary diagrams LR-DRE-M-1011-5 and LR-DRE-M-3496. These changes resulted in adding three component groups to LRA Table 2.3.3-16.

The applicant included non-safety-related heat exchangers (e.g., 1B-3802 at location E-5 on revised boundary diagram LR-QDC-M-22-1), oil coolers (e.g., 2-202-51C at location F-2 on revised boundary diagram LR-DRE-M-22), and generator stator water coolers (e.g., 3-7002-A at location E-10 on revised boundary diagram LR-DRE-M-355) in scope for the spatial interaction intended function and evaluated them with the component group, piping and fittings (spatial interaction), on Table 2.3.3-16 for AMR. The heat exchanger (cooler) leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the component group, piping and fittings (spatial interaction).

The following is the component groups and their intended functions within the SW system in the revised LRA Table 2.3.3-16 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- flow orifices (structural integrity/attached support, Quad Cities only)
- orifice bodies (pressure boundary, Dresden only)
- orifice bodies (throttle, Dresden only)
- piping and fittings (spatial interaction) (includes heat exchanger shells)
- piping and fittings (pressure boundary, Dresden only)

- piping and fittings (structural integrity/attached support, Quad Cities only)
- pumps (pressure boundary, Dresden only)
- strainer bodies (pressure boundary, Dresden only)
- strainer bodies (filter)
- strainer bodies (spatial interaction) (leakage boundary, Quad Cities only)
- tanks (spatial interaction) (leakage boundary, Dresden only)
- thermowells (pressure boundary, Dresden only)
- tubing (pressure boundary, Dresden only)
- tubing (spatial interaction) (leakage boundary)
- valves (spatial interaction)
- valves (structural integrity/attached support)
- valves (pressure boundary, Dresden only)

2.3.3.16.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.16, Dresden UFSAR Section 9.2.2, and Quad Cities UFSAR Section 9.2.2. Additionally, the staff reviewed other UFSAR sections that discussed the SW system to determine whether there is reasonable assurance that the SW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). At Dresden, these sections included 1.2, 2.4, 3.3.2, 3.4.1, 3.6.1, 5.4.6, 6.0.3, 6.2, 6.3.2, 6.4.2, 7.5.3, 9.1.3, 9.2.1, 9.2.3, 9.2.5, 9.2.7, 9.2.8, 9.4.6, 9.5.5, 11.0, 11.2, 11.5, 14.2.4, and 15.6.5. At Quad Cities, these sections included 1.2, 2.2.3, 3.7.3, 6.0, 6.1.10, 6.3.2, 6.4.2, 8.3.1, 9.1.3, 9.2.3, 9.2.7, 9.2.8, 9.3.1, 9.3.5, 9.5.1, 9.5.5, 11.5.2, and 14.2.12. The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the SW system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the SW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the SW system. The staff then reviewed the referenced P&I drawings to verify that those portions of the SW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.16, and that the applicant identified all SW system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.16 identified one area in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued an RAI to the applicant concerning the specific item needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAI and the applicant's response by letter dated October 3, 2003, are described below.

RAI-2.3.3.16-1. The staff observed that there are no references to buried piping in Table 2.3.3-16 of the LRA. RA and asked the applicant to provide the basis for not identifying any buried SW piping in Table 2.3.3-16.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.16-1 is that it reviewed LRA Section 2.3.3.16, Table 2.3.3-16, and agree with NRC staff that there is no aging management reference in Table 2.3.3-16 for the external surface of buried piping. The buried SW piping is included within the scope of license renewal. Section 2.3.3.16, Table 2.3.3-16, should have included the subject buried piping under the component group "piping and fittings (Dresden only)," with "pressure boundary" as the component intended function. Aging management reference 3.3.1.16 discusses the aging management of the buried piping external surfaces as a carbon steel component in open-cycle cooling water system (service water). Aging management reference 3.3.1.15 discusses the aging management of the piping internal surfaces as a carbon steel component in open-cycle cooling water system (service water). Aging management reference 3.3.1.16 was inadvertently omitted from LRA Section 2.3.3.16, Table 2.3.3-16. Aging management reference 3.3.1.16 should have been included in Table 2.3.3-16 as an aging management reference for buried SW piping.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.16-1 acceptable because the applicant (1) agrees with the staff that there is no aging management reference in LRA Table 2.3.3-16 for the external surface of buried piping; (2) has clarified that the subject buried SW piping is included within the scope of the Rule; and (3) acknowledges that aging management reference 3.3.1.16 was inadvertently omitted from LRA Table 2.3.3-16 that should have included the subject buried piping under the component group "piping and fittings (Dresden only)," with "pressure boundary" as the component intended function. Therefore, the staff considers its concern described in RAI 2.3.3.16-1 resolved.

2.3.3.16.3 Conclusions

The staff reviewed LRA Section 2.3.3.16 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the SW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.17 Reactor Building Closed Cooling Water System

2.3.3.17.1 Summary of Technical Information in the Application

The applicant described the reactor building closed cooling water system (RBCCW) in LRA Section 2.3.3.17 and provided a list of components subject to an AMR in LRA Table 2.3.3-17.

The function of the RBCCW system is to provide cooling for equipment and systems in the reactor. For Dresden only, the system also provides cooling water to the shutdown cooling heat exchangers. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following RBCCW system intended functions:

- primary containment isolation—provide primary containment isolation for those portions of the system that interface with the primary containment

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

- credited in regulated event(s) (Dresden only)— provides cooling water to the shutdown cooling heat exchangers to achieve and maintain cold shutdown during an Appendix R fire (at Dresden and Quad Cities the system also contains components that are relied upon for compliance with 10 CFR 50.49 (EQ))

The RBCCW system is a closed loop system. An expansion tank is connected to the common RBCCW pump suction header to ensure adequate net positive suction head for the pumps (two for each unit, with one additional shared spare). The pumps discharge into a common header from which cooling water is provided to loads arranged in several loops. One loop provides cooling to reactor building auxiliary loads such as the reactor water cleanup nonregenerative heat exchangers, the fuel pool heat exchangers, and the reactor building equipment drain tank heat exchanger. A loop inside the primary containment provides cooling to the primary containment coolers, primary containment equipment drain sump heat exchanger, and the reactor recirculation pump seals and motor oil coolers. For Dresden only, a loop also provides cooling to the shutdown cooling heat exchangers to achieve and maintain cold shutdown during an Appendix R fire. The loops all discharge into a common header at the inlet to the RBCCW heat exchangers (also two for each unit with one additional shared spare). The RBCCW discharge from the heat exchangers flows back into the RBCCW pump suction header. The SW system cools the RBCCW heat exchangers.

Primary containment isolation valves are provided for the RBCCW lines penetrating the primary containment.

In LRA Section 2.3.3.17, the applicant described the evaluation boundary of the RBCCW system. In addition, the applicant highlighted those portions of the RBCCW system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.17. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the component groups and their intended functions within the RBCCW system in LRA Table 2.3.3-17 as being within the scope of license renewal and subject to an AMR.

Resulting from the revised methodology described in the response to the draft SER Open Item 2.1-1 and clarified in a letter, dated June 22, 2004, the applicant expanded the system boundaries for the RBCCW system at both Dresden and Quad Cities due to the potential for spatial interaction with safety-related components. The applicant added all of the RBCCW components shown on revised boundary diagrams LR-DRE-M-20, LR-DRE-M-353, LR-QDC-M-33-1, LR-QDC-M-33-2, LR-QDC-M-75-1, and LR-QDC-M-75-2 to the scope of license renewal. These changes resulted in adding two component groups to LRA Table 2.3.3-17.

The following is component groups and their intended functions within the RBCCW system in the revised LRA Table 2.3.3-17 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- flow elements (pressure boundary, Dresden only)
- heat exchangers (pressure boundary, Dresden only)
- heat exchangers (heat transfer, Dresden only)
- heat exchangers (spatial interaction) (leakage boundary (spatial))
- manifolds (pressure boundary, Dresden only)
- NSR vents or drains, piping and valves (attached support) (structural integrity (attached), Quad Cities only)
- Orifice bodies (pressure boundary, Dresden only)
- piping and fittings (pressure boundary)
- piping and fittings, including flow elements (spatial interaction) (leakage boundary (spatial))
- piping and fittings (structural integrity/attached support, Quad Cities only)
- pumps (pressure boundary, Dresden only)
- pumps (spatial interaction) (leakage boundary (spatial))
- tanks (pressure boundary, Dresden only)
- tanks (spatial interaction) (leakage boundary (spatial))
- thermowells (pressure boundary, Dresden only)
- tubings (pressure boundary, Dresden only)
- tubings (spatial interaction) (leakage boundary (spatial))
- valves (pressure boundary)
- valves (spatial interaction)
- valves (structural integrity/attached support, Quad Cities only)

2.3.3.17.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.17, Dresden UFSAR Section 9.2.3, and Quad Cities UFSAR Section 9.2.3. Additionally, the staff reviewed other UFSAR sections that discussed the RBCCW system to determine whether there is reasonable assurance that the RBCCW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). At Dresden, these sections included 1.2, 3.6.2, 3.8, 5.2.5, 5.4.7, 6.2.1, 7.4.2, 9.1.2, 9.1.3, 9.3.2, 9.4.8, 11.5, and 14.2.4. At Quad Cities, these sections included 1.2, 5.2.5, 5.4.7, 5.4.8, 6.2.1, 9.1.3, 9.3.3, 9.4.7, and 11.5. The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the RBCCW system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the RBCCW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff reviewed and compared the referenced P&I drawings to the system drawings and descriptions in the UFSARs to ensure that they were representative of the RBCCW system. The staff then reviewed the referenced P&I drawings to verify that those portions of the RBCCW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.17, and that the applicant identified all RBCCW system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the RBCCW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.17. The RBCCW system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-17. The staff did not identify any omissions.

2.3.3.17.3 Conclusions

The staff reviewed LRA Section 2.3.3.17 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the RBCCW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the RBCCW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.18 Turbine Building Closed Cooling Water System

2.3.3.18.1 Summary of Technical Information in the Application

The applicant described the turbine building closed cooling water (TBCCW) system in LRA Section 2.3.3.18 and provided a list of components subject to an AMR in LRA Table 2.3.3-18.

The function of the TBCCW system is to provide the means for heat rejection from systems located in the turbine building and crib house. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following TBCCW system intended function:

- credited in regulated event(s) (Dresden only)—provides flow path for control rod drive pump cooling during an Appendix R fire

The TBCCW system is a closed loop system consisting of pumps, heat exchangers, an expansion tank, and necessary control and support equipment. The system removes heat from the following loads—circulating water pumps, feed pump lube oil and mechanical seal coolers, condensate and condensate booster pump seal coolers, CRD pump seal coolers, instrument air compressors, resin transfer air compressors, service air compressors, radwaste sparging air compressors, electrohydraulic control (EHC) oil coolers, bus duct coolers, and main generator alternator exciter cooler. Station SW provides the cooling medium on the tube side of the TBCCW heat exchangers.

In LRA Section 2.3.3.18, the applicant described the evaluation boundary of the TBCCW system. In addition, the applicant highlighted those portions of the TBCCW system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.18. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the component groups and their intended functions within the TBCCW system in LRA Table 2.3.3-18 as being within the scope of license renewal and subject to an AMR.

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1 and clarified in a letter, dated June 22, 2004, the applicant expanded the system boundaries for the TBCCW system at Dresden Station due to the potential for spatial interaction with safety-related components. Specifically, the applicant added all of the TBCCW pumps, heat exchangers, piping, valves, surge tank, and other passive system components to the scope of license renewal. The applicant added all of the components shown on revised boundary diagrams LR-DRE-M-21, LR-DRE-M-354-1 and LR-DRE-M-354-2 to the scope of license renewal. Additional components added to the scope along with system boundary flags are shown on revised boundary diagrams LR-DRE-M-37-7, LR-DRE-M-37-10, LR-DRE-M-177-1, LR-DRE-M-177-4, LR-DRE-M-178, LR-DRE-M-419-1, LR-DRE-M-419-4, LR-DRE-M-420, LR-DRE-M-421 and new boundary diagrams LR-DRE-M-177-3, LR-DRE-M-367-4, and LR-DRE-M-367-6.

The applicant previously excluded the TBCCW system at Quad Cities from the scope of license renewal. However, the applicant added the TBCCW system at Quad Cities to the scope of license renewal as a result of the scoping methodology change. Specifically, the applicant added all of the TBCCW pumps, heat exchangers, piping, valves, surge tank, and other passive system components to the scope due to the potential for spatial interaction with safety-related components in the same general area. The applicant added equipment highlighted on revised boundary diagram LR-QDC-M-462-3,and new boundary diagrams LR-QDC-M-21, LR-QDC-M-68, LR-QDC-M-459-1, LR-QDC-M-459-3, and LR-QDC-M-462-1 to the scope of license renewal. These changes resulted in adding three component groups to LRA Table 2.3.3-18.

The applicant included non-safety-related heat exchangers (e.g., cooling water heat exchangers, 1A-3802 at location D-3 on revised boundary diagram LR-QDC-M-21) and coolers (e.g., the alternator cooler at location E-9 on revised boundary diagram LR-QDC-M-21) in scope for the spatial interaction intended function and evaluated them with the component group, piping and fittings (spatial interaction), on Table 2.3.3-18 for AMR. The heat exchanger (cooler) leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the component group, piping and fittings (spatial interaction).

The following is component groups and their intended functions within the TBCCW system in the revised LRA Table 2.3.3-18 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- heat exchangers (pressure boundary)

- piping and fittings (pressure boundary)
- piping and fittings (spatial interaction) (includes heat exchanger shells) (leakage boundary (spatial))
- pumps (spatial interaction) (leakage boundary (spatial))
- tanks (spatial interaction) (leakage boundary (spatial))
- valves (pressure boundary)
- valves (spatial interaction) (leakage boundary (spatial))

2.3.3.18.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.18 and Dresden UFSAR Sections 9.2.7, 9.3.1, and 14.2.4 to determine whether there is reasonable assurance that the TBCCW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the TBCCW system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the TBCCW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSAR to ensure that the referenced P&I drawings were representative of the TBCCW system. The staff then reviewed the referenced P&I drawings to verify that those portions of the TBCCW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.18, and that the applicant identified all TBCCW system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.18 identified one area in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued an RAI to the applicant concerning the specific item to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4 and the screening criteria of 10 CFR 54.21. The staff's RAI and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI-2.3.3.18-1. The staff observed that on the TBCCW system piping flow diagram, LR-DRE-M-21, the control rod drive system drain valve 2-3868-B-500 (for pump 2-382-3B) and associated piping from the header to the drain valve are not shown in scope. The corresponding piping and drain valve (2-3868-A-500) for the pump 2-382-3A is shown in scope on LR-DRE-M-21. Also, not shown in scope is a portion of the piping from valve 2-3837-A-500 to the drain valve 2-3867-A-500 (near pump 2-382-3A). Failure of these lines could prevent the system from performing its intended function, which is to provide a flow path for control rod drive pump cooling during an Appendix R fire. The piping is passive, long lived, and not subject to qualified life or specified time period, and it performs an intended safety function of maintaining system integrity. The staff asked the applicant to provide the basis for exclusion of the valve and piping identified above.

Applicant's Response and Staff's Evaluation

In its response to RAI 2.3.3.18-1, the applicant stated that it believes that the staff intended to reference pumps 2-302-3A and 2-302-3B, rather than 2-382-3A and 2-382-3B.

The control rod drive system drain valve 2-3868-B-500 (for pump 2-302-3B), and the associated piping from the header to the drain valve 2-3868-B-500 (coordinate C-4) on the boundary diagram, should have been highlighted in green. Also, the portion of the piping from valve 2-3837-A-500 to the drain valve 2-3867-A-500 (near pump 2-302-3A), including the drain valve (coordinate D-4), should have been highlighted in green. The subject valves and piping are in scope of license renewal. LRA Section 2.3.3.18, Table 2.3.3-18, includes the subject piping and valve under the component groups "piping and fitting" and "valves."

Based on its review of the applicant's clarification discussed above, the staff agrees with the applicant that the staff intended to reference pumps 2-302-3A and 2-302-3B, rather than 2-382-3A and 2-382-3B. Also, the staff finds the applicant's response to RAI 2.3.3.18-1 has clarified that the subject components and piping are within the scope of the Rule and subject to an AMR, and they were inadvertently not highlighted in green (in scope components per 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(3)) in the LR boundary diagrams. In addition, the subject piping and valve are included in LRA Table 2.3.3-18 under component groups "piping and fitting" and "valves." Therefore, the staff finds the applicant's response to RAI 2.3.3.18-1 acceptable and considers its concern described in RAI 2.3.3.18-1 resolved.

2.3.3.18.3 Conclusions

The staff reviewed LRA Section 2.3.3.18, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. The staff did not identify any omissions. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the TBCCW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the TBCCW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.19 Demineralizer Water Makeup System

2.3.3.19.1 Summary of Technical Information in the Application

The applicant described the demineralizer water makeup (DWM) system in LRA Section 2.3.3.19 and provided a list of components subject to an AMR in LRA Table 2.3.3-19.

The function of the DWM system is to provide reactor quality water for use in power plant systems, equipment, and service drops. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following DWM system intended functions:

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment
- isolation condenser alternate makeup water (Dresden)—provides alternate makeup water to the isolation condenser.
- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected (Dresden only)

The DWM system consists of all equipment required to transfer water from the well water storage tank, through the makeup demineralizers, and into the various water storage tanks on site. Well water flows from the well water transfer pumps (which are classified within the out-of-scope well water system for Quad Cities) through the makeup demineralizers, to either the clean or contaminated demineralized water storage tank. Dresden has permanently installed demineralizers, and both stations have portable demineralizers. The clean demineralized water transfer pumps take suction from the clean demineralized water storage tank and supply clean demineralized water through a distribution header to plant systems and equipment, such as makeup to the standby liquid control system, the plant heating system, and the reactor building and turbine building closed cooling water systems. The DWM system also supplies various system loop seals, the Unit 1 fuel building (Dresden only), sample panels, and clean demineralized water service drops inside the primary containment and throughout the plant. Containment isolation valves are provided for the clean demineralized water lines that penetrate the containment. Additionally, at Dresden, the distribution header provides makeup water to the isolation condenser and emergency makeup water to the fuel pools. Also, at Dresden, the isolation condenser makeup pumps take suction from the clean demineralized water storage tank and discharge into a common header that supplies the isolation condensers for both Units 2 and 3.

In LRA Section 2.3.3.19, the applicant described the DWM system evaluation boundary. In addition, the applicant highlighted those portions of the DWM system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.19. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the component groups and their intended functions within the DWM system in LRA Table 2.3.3-19 as being within the scope of license renewal and subject to an AMR.

Resulting from the revised methodology described in the response to the draft SER Open Item 2.1-1, the applicant expanded the system boundaries for the DWM system at both Dresden and Quad Cities due to the potential for spatial interaction with safety-related components. Specifically, the applicant added associated piping components located in the Turbine Building that could spatially interact with safety-related components in the same general area to the scope of license renewal. Added piping components are shown on revised boundary diagrams LR-DRE-M-177-1, LR-QDC-M-462-3, LR-DRE-M-419-1, LR-DRE-M-35-1, LR-DRE-M-366, LR-DRE-M-269-3, LR-DRE-M-269-3, LR-QDC-M-58-1 LR-QDC-58-3 and new boundary diagrams LR-QDC-M-31, LR-QDC-M-459-1, LR-QDC-M-459-3, LR-QDC-M-462-1, LR-DRE-M-177-3, LR-

DRE-M-419-3, LR-DRE-M-35-2, and LR-DRE-M-530-1. As results of these changes one new component group was added to LRA Table 2.3.3-19 and additional aging management references were added to two component groups.

The applicant identified the following component groups and their intended functions within the DWM system in the revised LRA Table 2.3.3-19 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- flow elements (spatial interaction, Quad Cities only)
- non-safety-related vents or drains, piping, and valves (support integrity/attached support, Quad Cities only)
- piping and fittings (pressure boundary)
- piping and fittings (spatial interaction)
- piping and fittings (support integrity/attached support)
- pumps (pressure boundary, Dresden only)
- pumps (spatial interaction, Quad Cities only)
- restricting orifices (pressure boundary, Dresden only)
- restricting orifices (spatial interaction, Quad Cities only)
- strainers (spatial interaction, Quad Cities only)
- tubing (spatial interaction, leakage boundary (spatial))
- valves (pressure boundary)
- valves (spatial interaction)
- valves (support integrity/attached support, Quad Cities only)

2.3.3.19.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.19, Dresden UFSAR Section 9.2.4, and Quad Cities UFSAR Section 9.2.4 to determine whether there is reasonable assurance that the DWM system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the DWM system in the LRA.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the DWM system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the DWM system. The staff then reviewed the referenced P&I drawings to verify that those portions of the DWM system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.19, and that the applicant identified all DWM system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.19 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping criteria of 10 CFR 54.4 and the screening criteria of 10 CFR 54.21(a)(1). The staff's scoping RAIs and the applicant's responses by letters, dated October 3, 2003, and January 26, 2004, are described below.

RAI 2.3.3.19-1. In LRA Section 2.3.3.19, the applicant stated that the demineralized water makeup system distribution header provides emergency makeup to the spent fuel pool. However, this function is not identified as an intended function in LRA Section 2.3.3.19. Without knowing the basis for the applicant's determination that emergency spent fuel pool makeup is not an intended function, the staff is unable to verify the acceptability of the applicant's system scoping and screening results. Therefore, in RAI 2.3.3.19-1, the staff requested the applicant to provide the basis for concluding that emergency spent fuel pool makeup is not an intended function of the demineralized water makeup system according to the criteria described in 10 CFR 54.4(b).

Applicant's Response and Staff's Evaluation

In its response to RAI 2.3.3.19-1, the applicant stated that the DMW system provides emergency makeup water to the spent fuel pools, but this function is not a credited function in the current licensing basis and, therefore, is not a license renewal intended function. In the event of a complete loss of fuel pool cooling, the fuel pool water temperature will begin to rise and eventually will reach the boiling temperature, and the fuel pool water will boil off. However, there will be sufficient time to establish makeup water to the fuel pool from various available systems which include the condensate transfer system, the DMW system, and the fire water systems. For these reasons, emergency spent fuel pool makeup is not an intended function of the DMW system.

Based on its review, the staff finds that the DMW system is included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). However, the capability of the DMW system to provide emergency makeup water to the spent fuel pools is not credited in the current licensing basis. The failure of the DMW system would not prevent other systems from satisfactorily providing emergency makeup water to the spent fuel pools. Therefore, the staff agrees with the applicant that providing emergency makeup water to the spent fuel pools is not an intended function of the DMW system in accordance with 10 CFR 54.4. The staff finds the applicant's response to RAI 2.3.3.19-1 acceptable and considers its concern described in RAI 2.3.3.19-1 resolved.

RAI 2.3.3.19-2. In RAI 2.3.3.19-2, the staff requested the applicant to provide information concerning three symbols used on LR boundary diagrams referenced in LRA Section 2.3.3.19, so that the staff could verify that the scoping and screening results in the LRA are consistent with 10 CFR 54.4 and 10 CFR 54.21. The staff could not locate the three symbols on the symbol legend submitted with the LRA.

Applicant's Response and Staff's Evaluation

In its response, the applicant provided interpretation of four symbols used in the P&I drawings referenced in LRA Section 2.3.3.19—one in drawing LR-DRE-M-366 (E-3), one in drawing LR-QDC-M-58-4 (C-8), one in drawing LR-DRE-M-1239-3 (F-6), and one in drawing LR-QDC-M-41-2 (E-2).

The staff finds that the interpretation of the symbols provided by the applicant clarifies the staff's concerns described in RAI 2.3.3.19-2. The staff determined that no additional component needed to be within the scope of license renewal. Therefore, the staff finds the applicant's response to RAI 2.3.3.19-2 acceptable and considers its concern described in RAI 2.3.3.19-2 resolved.

RAI 2.3.3.19-3. In RAI 2.3.3.19-3, the staff requested the applicant to provide the basis for concluding that an oil drain line for clean demineralized water pump 1/2-4303B is not within the scope of license renewal in accordance with 10 CFR 54.4(a), as similar oil drain lines for the "A" and "C" clean demineralized water pumps are considered to be within the scope of license renewal. It was not apparent to the staff whether the exclusion of the oil drain line for the "B" pump was justified or an oversight.

Applicant's Response and Staff's Evaluation

In its response to RAI 2.3.3.19-3, the applicant stated that the oil drain line for clean demineralized water pump 1/2-4303B is in the scope of license renewal similar to oil drain lines for the "A" and "C" clean demineralized water pumps. Boundary diagram LR-QDC-M-58-1 should have highlighted these components within the scope of license renewal. The subject piping and valve components are subject to an AMR and are included in LRA Table 2.3.3-19 under component group, "piping and fittings (spatial interaction)," with leakage boundary (spatial) intended function.

Based on its review of the applicant's clarification discussed above, the staff concurs with the applicant's clarification that the above-cited oil drain line and its associated components are within the scope of the Rule, and they were inadvertently not highlighted in the LR boundary diagrams. Also, because the components associated with the cited oil drain line are included in LRA Table 2.3.3-19, subject to an AMR, the staff finds the applicant's response to RAI 2.3.3.19-3 acceptable. Therefore, the staff considers its concern described in RAI 2.3.3.19-3 resolved.

RAI 2.3.3.19-4. In RAI 2.3.3.19-4, the staff requested the applicant to provide the basis for concluding that the demineralized water makeup system is capable of performing its intended functions without relying upon the integrity of numerous unisolable piping lines and connected components (the piping lines and components are listed in RAI 2.3.3.19-4), and that the failure of these unisolable lines and connected components would not prevent other systems from satisfactorily accomplishing their intended functions for license renewal. From the information available in the LRA, it is not apparent to the staff why the unisolable components listed in RAI 2.3.3.19-4 are not required to be within the scope of license renewal, in accordance with 10 CFR 54.4(a), as a result of the above criteria.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.19-4 states the preferred makeup source to the isolation condenser is the dedicated diesel driven makeup pumps that take suction from the clean demineralized water tank. The clean demineralized water system is designed to supply water to multiple sources in parallel with the isolation condenser diesel driven makeup pump. For this reason, leakage in any of the branch connections described in the RAI would not prevent this preferred path from fulfilling its function.

The demineralized water makeup system provides an alternate supply of makeup water to the Isolation Condenser shell from the clean demineralized water storage tank. Therefore the portion of the demineralized water makeup system in the flow path to the Isolation Condenser shell, including the clean demineralized water pumps, piping, associated valves, and instrumentation are included within the scope of license renewal. When establishing the in-scope boundary of the demineralized water makeup system for license renewal, credit was allowed for operator action to close accessible, normally open, manual isolation valves.

The branch connections on the demineralized water piping system that are not included within the scope of license renewal are located within the power block (turbine building, reactor building, radwaste) where detection in the event of failure would be detected. In the event of a significant demineralized water line break, operators would receive a control room low pressure alarm for the clean demineralized water header. Site operating procedure, DAN 923-1 C-6, Clean Demon. Water Pp Trip/Press Lo, directs operators to check for excessive use of clean demineralized water and to troubleshoot as needed. Operators would also detect any abnormal increase of input to plant sumps that are monitored continuously by operators in the radwaste control room. Individual sump inputs are monitored which would assist operations personnel in locating the area of any clean demineralized water line break. Operators would respond to these indications of plant leakage and take appropriate actions to isolate the leakage.

Those portions of the clean demineralized water system that can spatially interact with safety-related equipment were included during previous system scoping efforts. A pipe break and/or leak from remaining portions of the clean demineralized piping that are not in scope can not spatially affect safety-related components.

The valves listed below were added to the scope of license renewal and will be managed for aging. Operator closure of these valves would isolate a failure in the out of scope portions of the system located downstream and re-establish the demineralized water system pressure boundary and makeup flow path to the isolation condenser. This action eliminates the need for placing the downstream components within the scope of license renewal.

2-4303-500	2-4399-792	3-4399-711
2-4308-500	3-4399-706	3-4305-500
2-4308-501	3-4399-707	2/3-5799-1113
2-4309-500	3-4399-708	2/3-5799-1115
2-4399-730	3-4399-709	2/3-4311-500
2-4399-732	3-4399-710	2/3-4399-67

In addition, the following valves will be added to the scope of license renewal: check valve 2/3-4300-852 (This valve isolates the branch connection on LR-DRE-M-35-1, grid location D-7, from drawing M-1011-2) and the unnumbered vent valve in line 2-4386-1"-L at grid location D-4 on LR-DRE-M-35-1.

Based on its review of the applicant's clarification discussed above, the staff concurs with the applicant's clarification that the operators will be able to identify system failure and close the appropriate valve before the DMW system becomes unable to perform its intended function of providing an alternate supply of makeup water to the Isolation Condenser shell. The applicant also included the above-mentioned valve within scope of License Renewal and subject to AMR. The Clean Demineralized Water Storage Tank (CDWST) has a capacity of 200,000 gallons and the DMW system was designed to supply water to multiple systems. A failure of the system sections downstream of these manual valves would be identified by several means before the CDWST inventory drops to levels that would prevent the DMW system from performing its intended function of providing an alternate supply of makeup water to the Isolation Condenser shell. The applicant also has in place procedures the will direct the operator to check the above-mentioned system sections for possible leakage. Therefore, the staff considers its concern described in RAI 2.3.3.19-4 resolved.

2.3.3.19.3 Conclusions

The staff reviewed LRA Section 2.3.3.19 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the DMW makeup system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the DMW makeup system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.20 Residual Heat Removal Service Water System (Quad Cities Only)

2.3.3.20.1 Summary of Technical Information in the Application

The applicant described the residual heat removal service water (RHRSW) system in LRA Section 2.3.3.20 and provided a list of components subject to an AMR in LRA Table 2.3.3-20.

The function of the RHRSW system is to—remove heat from the suppression chamber, in conjunction with the containment cooling mode of the residual heat removal system; remove heat from the reactor coolant, in conjunction with the shutdown cooling mode of the residual heat removal system; provide a safety-related source of cooling water to the train "B" control room HVAC refrigerant condensing unit as a backup during a loss of offsite power; provide a cross-tie to the opposite unit to achieve safe shutdown for fire events in accordance with Appendix R to 10 CFR Part 50; and provide an auxiliary function during refueling by assisting in the removal of heat from the spent fuel pool.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following RHRSW system intended functions:

- containment and component cooling—provides a heat sink for the RHR system via the RHR heat exchangers to support containment cooling after a LOCA
- back-up cooling—provides safety-related back-up cooling to the "B" train of the control room HVAC refrigeration units as a backup during a loss of offsite power and LOCA

- credited in regulated event(s)—provides a heat sink for the RHR system via the RHR heat exchangers to support ATWS actions and in the Appendix R fire safe shutdown analysis (The subsystems between the units can be connected by a normally isolated crosstie line that is credited in the plant's fire protection safe shutdown analysis. The system also contains components that are relied upon for compliance with 10 CFR Part 50.49 (EQ).)

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The RHRSW system is an open-loop cooling water system consisting of four two-stage pump sets (i.e., two pumps driven by a single motor), associated valves, piping, and instrumentation and controls, divided into two independent loops. The RHRSW system removes heat from the RHR heat exchangers, which are evaluated as part of the RHRSW system. During RHRSW system operation, the pressure on the tube side of the RHR heat exchanger is maintained above the shell side to prevent reactor water leakage into the SW and thereby into the discharge bay.

In LRA Section 2.3.3.20, the applicant described the RHRSW system evaluation boundary. In addition, the applicant highlighted those portions of the RHRSW system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.20. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the component groups and their intended functions within the RHRSW system in LRA Table 2.3.3-20 as being within the scope of license renewal and subject to an AMR.

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the applicant expanded the system boundaries for the RHRSW system at Quad Cities due to the potential for spatial interaction with safety-related components. The applicant included all of the components shown on new boundary diagrams LR-QDC-M-22-2 and LR-QDC-M-69-2 to the scope of license renewal. As results of these changes two new component groups were added to LRA Table 2.3.3-20.

The applicant identified the following component groups and their intended functions within the RHRSW system in the revised LRA Table 2.3.3-20 as being within the scope of license renewal and subject to an AMR:

- auxiliary and RW HVAC air handlers heating/cooling (pressure boundary)
- auxiliary and RW HVAC air handlers heating/cooling (heat transfer)
- closure bolting (pressure boundary)
- dampeners (pressure boundary)
- ducts and fittings, access doors, closure bolts, and equipment frames (pressure boundary)
- heat exchangers (pressure boundary)
- heat exchangers (heat transfer)
- non-safety-related vents or drains, piping, and valves (structural integrity/attached support)
- NSR Vents or Drains, Piping and Valves (spatial interaction) (Quad Cities only)
- orifice bodies (pressure boundary)
- orifice bodies (throttle)
- piping and fittings (structural integrity/attached support)

- pulsation dampeners (pressure boundary)
- pumps (pressure boundary)
- pumps (spatial interaction) (Quad Cities only)
- sight glasses
- strainer bodies (pressure boundary)
- strainer screens
- thermowells (pressure boundary)
- tubing (pressure boundary)
- tubing (structural integrity/attached support)
- valves (pressure boundary)
- valves (structural integrity/attached support))

2.3.3.20.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.20 and Quad Cities USAR Sections 3.4.1.2, 5.4.7, 6.2.2, 6.3, 9.1.3.2, 9.2.1, and 9.2.5 to determine whether there is reasonable assurance that the RHRSW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the RHRSW system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the RHRSW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSAR to ensure that the referenced P&I drawings were representative of the RHRSW system. The staff then reviewed the referenced P&I drawings to verify that those portions of the RHRSW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.20, and that the applicant identified all RHRSW system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.20 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.20-1. In RAI 2.3.3.20-1, the NRC staff requested the applicant to provide the basis for concluding that the LR scoping criteria of 10 CFR 54.4(a) do not require all piping and associated components necessary to discharge the flow of RHRSW returning from the control room HVAC refrigerant condensing unit to be within the scope of license renewal. From the associated LR boundary diagrams, it appears to the staff that the applicant only considered the portion of the discharge flowpath upstream of locked-open valve 0-5799-388 to be within scope.

Applicant's Response and Staff's Evaluation

In its response to RAI 2.3.3.20-1, the applicant stated that the associated flow path cited above is required for the performance of the control room HVAC refrigeration condensing unit, and the components and piping sections are in the scope of license renewal. The subject line was inadvertently left out of scope on the boundary diagram. The boundary diagram should have included the path (up to and including valves required to maintain the path) in the scope of license renewal. The following existing boundary diagrams should have also reflected the components in the flow path in the scope of license renewal—LR-QDC-M-22-1, Service Water Piping; LR-QDC-M-22-3, Service Water Piping—Diesel Generator Cooling Water; LR-QDC-M-22-5, Service Water Piping; and LR-QDC-M-725-3, Control Room HVAC.

The components and piping sections discussed above and their intended functions are included in LRA Table 2.3.3-20 under component groups "piping and fittings," "valves," and "orifice bodies," as being within the scope of license renewal and subject to an AMR.

Based on its review, the staff finds that the applicant has clarified that the subject components and piping are within the scope of the Rule and subject to an AMR. These components and piping were inadvertently not highlighted in the LR boundary diagrams, however, they are included in LRA Table 2.3.3-20, subject to an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.3.20-1 acceptable and considers its concern described in RAI 2.3.3.20-1 resolved.

RAI 2.3.3.20-2. In RAI 2.3.3.20-2, the NRC staff requested that the applicant provide the basis for concluding that a temperature element connected to the outlet line 2-1043A-14"-L from the residual heat removal heat exchanger 2-1003A is not within the scope of license renewal according to 10 CFR 54.4(a). The applicant's treatment of this temperature element contrasts with the treatment of similar temperature elements connected to in-scope piping on the *associated LR boundary diagram (LR-QDC-M-79). Therefore, the staff requested that the* applicant provide additional information to verify that the scoping criteria of 10 CFR 54.4(a) are satisfied.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.20-2, the applicant stated that the subject instrument was inadvertently not highlighted on the boundary diagram. Boundary diagram LR-QDC-M-79 should have highlighted the temperature element and associated tap (thermowell) in the scope of the Rule. However, the temperature element, which is not part of the pressure boundary, is an active component and does not require an aging management. The tap is subject to an AMR and is included in LRA Table 2.3.3-20 under component group "piping and fittings."

Based on its review, the staff finds the applicant's response to RAI 2.3.3.20-2 acceptable. The staff concurs with the applicant's clarification that the temperature element and associated tap are in scope of the scope of the Rule, the temperature element is not subject to an AMR because it is an active component, the associated tap is included in LRA Table 2.3.3-20 subject to an AMR, and the temperature element and associated tap were inadvertently not highlighted in the LR boundary diagram. Therefore, the staff considers its concern described in RAI 2.3.3.20-2 resolved.

RAI 2.3.3.20-3. In RAI 2.3.3.20-3, the NRC staff requested that the applicant explain apparent scoping inconsistencies regarding four corrosion coupon holders on two LR boundary diagrams (LR-QDC-M-37 and LR-QDC-M-79). All coupon holders except one show the connecting piping and valves to be within the scope of license renewal. Also, for only one of the coupon holders is the holder itself shown as being within the scope of license renewal. The staff requested that the applicant explain these two apparent inconsistencies so that the staff could verify whether or not the applicant's scoping results are consistent with 10 CFR 54.4(a). The staff could also not determine whether the applicant had included the coupon holders in the AMR results listed in LRA Table 2.3.3-20.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.20-3, the applicant stated that the coupon holder (1-1005B) and associated isolation valve (1-1099-36B) located at C-8 on boundary diagram LR-QDC-M-37, and coupon holders (2-1005A and 2-1005B) located at C-3 and C-8 on boundary diagram LR-QDC-M-79 are in scope of license renewal but were inadvertently not highlighted in the boundary diagrams. The coupon holder (1-1005A) located at B-3 on LR-QDC-37 is appropriately identified on the boundary diagram as in scope of license renewal. The applicant further stated that LRA Table 2.3.3-20 includes the above-listed components under component groups "piping and fittings," and "valves."

Based on its review, the staff finds that the applicant has clarified that the four corrosion coupon holders and associated isolation valves are within the scope of license renewal and are included in LRA Table 2.3.3-20, subject to an AMR. These components were inadvertently not highlighted in the flow diagram, however, they are included in LRA Table 2.3.3-20 subject to an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.3.20-3 acceptable and considers its concerns described in RAI 2.3.3.20-3 resolved.

RAI 2.3.3.20-4. In RAI 2.3.3.20-4, the NRC staff requested that the applicant provide the basis for concluding that a segment of piping (1-10111C-1"-D) that is connected to in-scope piping line 1-1003C-12"-D is not within the scope of license renewal in accordance with 10 CFR 54.4(a). The applicant's scoping classification for this segment of piping contrasts with the treatment of similar segments of piping on the associated LR boundary diagram (LR-QDC-M-37). As a result of the apparent inconsistency, it is not clear to the staff that the criteria of 10 CFR 54.4(a) are satisfied.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.20-4, the applicant stated that boundary diagram LR-QDC-M-37 should have been highlighted to include the line (and pipe cap) in the scope of license renewal. This line is in scope for license renewal but was inadvertently not highlighted in the LR boundary diagram. The applicant further stated that LRA Table 2.3.3-20 includes the above-cited line under component group "piping and fittings."

Based on its review, the staff finds that the applicant has clarified that the subject segment of piping was within the scope of license renewal and subject to an AMR. The subject segment of piping was inadvertently not highlighted in the flow diagram, however, it is included in LRA Table 2.3.3-20, subject to an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.3.20-4 acceptable and considers its concerns described in RAI 2.3.3.20-4 resolved.

RAI 2.3.3.20-5. In RAI 2.3.3.20-5, the NRC staff requested that the applicant provide the basis for not including flow elements as an entry in LRA Table 2.3.3-20 (which contains the AMR results for the RHRSW system) to verify that the criteria set forth in 10 CFR 54.21(a)(1) have been satisfied. License renewal boundary diagrams associated with the RHRSW system depict flow elements within this system as being within the scope of license renewal; however, they are not included in the RHRSW AMR results table, as is done in the AMR results tables for various other systems in the LRA (e.g., DWM system and CCSW system).

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.3.20-5, the applicant stated that LRA Tables 2.3.3-20, 2.3.3-19, and 2.3.3-21 identify the component groups requiring AMR for the RHRSW, DWM, and CCSW systems, respectively. The component groups identified in these tables were derived from component types identified in each site's component maintenance database (Passport). The designation of these database component types was not uniformly provided at the two sites. Consequently, the database included component type designations corresponding to "flow elements," "restricting orifices," and "orifice bodies," interchangeably to represent orifice bodies. Similarly, the component groups "flow elements," "restricting orifices," and "orifice bodies," as identified in the cited Chapter 2 tables, describe orifice bodies serving pressure/leakage boundary or throttle functions.

The subject flow elements 2-1041-A, 2-1041-B, 1-1041-A, and 1-1041-B are depicted at the cited locations on boundary diagrams LR-QDC-M-79 and LR-QDC-M-37. LRA Table 2.3.3-20 includes entries for orifice bodies with component intended functions of "Pressure Boundary" and "Throttle" to address these flow elements.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.20-5 acceptable because the applicant has explained that the components identified in RAI 2.3.3.20-5 were given different type of identification at the two sites, but are already within the scope of license renewal and are included in LRA Table 2.3.3-20, subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.3.20-5 resolved.

2.3.3.20.3 Conclusions

The staff reviewed LRA Section 2.3.3.20 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the components of the RHRSW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the RHRSW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.21 Containment Cooling Service Water System (Dresden Only)

2.3.3.21.1 Summary of Technical Information in the Application

The applicant described the containment cooling service water (CCSW) system in LRA Section 2.3.3.21 and provided a list of components subject to an AMR in LRA Table 2.3.3-21.

The function of the CCSW system is to remove heat from the primary containment by providing cooling water to the LPCI heat exchangers. Also, the CCSW system, in conjunction with LPCI, limits the suppression chamber bulk water temperature to provide assurance that—suppression chamber hydrodynamic loads during blowdown would not adversely impact the integrity of structures and equipment; complete steam condensation occurs during a LOCA to limit long-term primary containment pressure; and adequate NPSH exists for ECCS pumps to maintain long-term primary containment pressure control. The Unit 2 CCSW loops provide a safety-related source of SW to the control room air conditioning condensers. The CCSW system also supplies a safety-related source of river water to the LPCI and HPCI room coolers (evaluated with the ECR-HVAC) as a backup to the SW system. The CCSW is credited for certain regulated events, as per the definition in 10 CFR 54.4(a)(3), which include—providing redundancy in suppression chamber cooling during an ATWS event; operating with reliance upon external source of power for an SBO event; mitigating fire events, in accordance with Appendix R to 10 CFR Part 50; and containing system components that are relied upon for compliance with environmental qualification requirements in 10 CFR 50.49.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following CCSW system intended functions:

- containment and component cooling—provides containment cooling function, cooling to the ECCS room coolers, and the CCSW water vault coolers to maintain room temperatures
- back-up cooling (Dresden Unit 2 only)—CCSW provides safety-related back-up cooling to the "B" train of the control room HVAC refrigeration units
- credited in regulated event()s—provides redundancy in suppression chamber cooling during an ATWS event, operates without reliance upon external sources of power (SBO), is credited in the Appendix R fire safe shutdown analysis, and the system contains components that are relied upon for compliance with 10 CFR Part 50.49 (EQ)
- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected.

The CCSW system is an open-loop cooling water system consisting of four pumps, associated valves, piping, and instrumentation and controls. The CCSW system removes heat from the LPCI heat exchangers, which are evaluated as part of the CCSW system. The CCSW pumps develop sufficient head to maintain the cooling water heat exchanger tube side outlet pressure greater than the LPCI subsystem pressure on the shell side. Maintaining this pressure differential prevents reactor water leakage into the SW and thereby into the river.

In LRA Section 2.3.3.21, the applicant described the CCSW system evaluation boundary. In addition, the applicant highlighted those portions of the CCSW system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.21. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the RHRSW system in LRA Table 2.3.3-21 as being within the scope of license renewal and subject to an AMR:

- auxiliary and RW HVAC air handlers heating/cooling (pressure boundary)
- auxiliary and RW HVAC air handlers heating/cooling (heat transfer)
- closure bolting (pressure boundary)
- ducts and fittings, access doors, closure bolts, and equipment frames (pressure boundary)
- flow elements (pressure boundary)
- heat exchangers (pressure boundary)
- heat exchangers (heat transfer)
- orifice bodies, including manifolds, tubes, and thermowells (pressure boundary)
- piping and fittings (structural integrity/attached support)
- pumps (pressure boundary)
- strainer bodies (pressure boundary)
- strainer screens (filter)
- thermowells (pressure boundary)
- tubing (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached support)

2.3.3.21.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.21 and Dresden UFSAR Sections 3.4.1.2, 6.2.2, 6.3.1.2, 6.4, and 9.2.1 to determine whether there is reasonable assurance that the CCSW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the CCSW system in the LRA.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the CCSW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the CCSW system. The staff then reviewed the referenced P&I drawings to verify that those portions of the CCSW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.21, and that the applicant identified all CCSW system components within the scope of license renewal and subject to an AMR in accordance with 10

CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items needed to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.21-1. In RAI 2.3.3.21-1, the staff requested the applicant to provide the basis for apparent scoping discrepancies on the referenced P&I drawings, LR-DRE-M-29-2 (Unit 2) and LR-DRE-M-360-2 (Unit 3). Specifically, differences in the marking of pressure indicators and flow transmitters on these boundary diagrams indicate that corresponding components at Units 2 and 3 have been brought within the scope of license renewal for different reasons. The staff requested this information to ensure that the applicant has correctly identified the system intended functions for license renewal, as defined by 10 CFR 54.4(b), and the in-scope components, in accordance with 10 CFR 54.4(a).

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.21-1 states that the subject instruments and associated upstream non-safety-related piping are in scope of license renewal because they meet the requirements of 10 CFR 54.4(a)(2) regarding non-safety-related components attached to safety-related components. Boundary diagrams LR-DRE-M-29-2 and LR-DRE-360-2 should have highlighted these components in red, which indicates in scope components in accordance with 10 CFR 54.4(a)(2) for non-safety-related components and systems.

Based on its review of the applicant's clarification discussed above, the staff finds that the subject instruments and associated upstream non-safety-related piping were in scope for license renewal. They were inadvertently not highlighted in the LR boundary diagram. However, the subject components are included in LRA Table 2.3.3-21, subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.3.21-1 resolved.

RAI 2.3.3.21-2. In RAI 2.3.3.21-2, the staff requested the applicant to provide the basis for concluding that an unisolable segment of piping (and associated components) connected to in-scope piping line 3-15112-3"-H (see boundary diagram LR-DRE-M-360-2, location A-5) is not within the scope of license renewal according to 10 CFR 54.4(a). The staff could not determine why the unisolable piping segment and associated components (up to the first isolation valve) are not necessary for the CCSW system to perform its intended functions. Therefore, the staff requested that the applicant provide additional information to verify that the scoping criteria of 10 CFR 54.4(a) are satisfied.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.21-2 states that boundary diagram LR-DRE-360-2 should have highlighted the pipe segment cited above in green to designate that the components are in the scope of license renewal. This segment and associated components are included in LRA Table 2.3.3-21 under component group "piping and fittings, including manifolds, tubes, and thermowells" subject to an AMR.

Based on its review of the applicant's clarification discussed above, the staff concurs with the applicant's clarification that the above-cited segments of piping and their associated components are within the scope of the Rule. They were inadvertently not highlighted in the LR boundary diagram. However, the components associated with the cited segments of piping are included in LRA Table 2.3.3-21, subject to an AMR. Therefore, the staff finds the applicant's response to RAI 2.3.3.21-2 acceptable and considers its concern described in RAI 2.3.3.21-2 resolved.

RAI 2.3.3.21-3. In RAI 2.3.3.21-3, the staff requested the applicant to provide the basis for concluding that the CCSW system is capable of performing its intended functions without relying upon the integrity of three unisolable piping lines and associated components (the piping lines 2/3-3936-3"-0, 2/3-3921-6"-0, and 2/3-3915-16"-0 shown in boundary diagram LR-DRE-M-22), and that the failure of these unisolable lines and associated components would not prevent other systems from satisfactorily accomplishing their intended functions for license renewal. The unisolable piping lines are connected to the CCSW return line from the control room air conditioning condensers, upstream of its termination at a standpipe, which eventually discharges to the circulating water discharge header. From the information available in the LRA, it is not apparent to the staff why the unisolable piping and associated components referenced in RAI 2.3.3.21-3 are not required to be within the scope of license renewal, in accordance with 10 CFR 54.4(a), as a result of the above criteria.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.21-3 states that boundary diagram LR-DRE-M-22 should have highlighted the pipe segment cited above in green to designate that the components are in the scope of license renewal. This segment and associated components are included in LRA Table 2.3.3-21 under component groups "piping and fittings," "valves," and "orifice bodies," subject to an AMR.

Based on its review, the staff finds the applicant's response to RAI 2.3.3.21-3 acceptable. The applicant clarified that the subject components are within the scope of the Rule and subject to an AMR, and they were inadvertently not highlighted in the LR boundary diagram. However, the subject components are included in LRA Table 2.3.3-21, subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.3.21-3 resolved.

2.3.3.21.3 Conclusions

The staff reviewed LRA Section, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the CCSW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the CCSW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.22 Ultimate Heat Sink System

2.3.3.22.1 Summary of Technical Information in the Application

The applicant described the ultimate heat sink (UHS) system in LRA Section 2.3.3.22 and provided a list of components subject to an AMR in LRA Table 2.3.3-22.

The function of the UHS system is to provide sufficient cooling water to the station, when the normal heat sink is unavailable, to permit operation of the CCSW system at Dresden, the RHRSW at Quad Cities, and the DGCW pumps at both stations. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following CCSW system intended functions:

- ultimate cooling water supply—provides sufficient cooling water to the station to permit operation of the CCSW system and the DGCW pumps when the normal heat sink (the river) is unavailable (Dresden)

- ultimate cooling water supply—provides sufficient cooling water to the station to permit operation of the residual heat removal SW pumps and the diesel generator cooling water pumps when the normal heat sink (the river) is unavailable (Quad Cities)

At Dresden, the Kankakee River is the normal source of emergency cooling water. If the Dresden Island Lock and Dam on the Illinois River were to fail, the Kankakee River level would fall below the high point of the Dresden intake flume. At Quad Cities, the Mississippi River is the normal source of emergency cooling water. If Lock and Dam No. 14 on the Mississippi River were to fail, the Mississippi River level would fall below the high point of the Quad Cities intake flume. For both stations, the design of the UHS would trap a limited supply of water in the intake and discharge canals in the event of the loss of the dammed water.

The applicant states that, at Dresden, the natural topography forms the UHS basin with the level stabilizing at elevation 495'-0", the high point of the intake flume. The CCSW pumps take suction from the center compartment of the crib house at elevation 498'-0", above the UHS basin level. To provide adequate suction for the CCSW pumps necessitates isolating the center compartment and raising its water level. Isolation is accomplished by replacing the normal wire mesh screens in the center compartment openings with stop logs. The dewatering valves are opened to allow water from the crib house forebay to flood the trash rake refuge pit, the refuge pumps are lined up to discharge to the center compartment, and the pumps are operated to flood the compartment above the CCSW pump suction. A CCSW pump (evaluated with the CCSW system) is placed in service, discharging to the containment cooling heat exchanger, and then to the discharge canal. The deicing valve is opened, allowing flow from the discharge canal back to the forebay. A portable, low-head, high-volume, engine-driven pump could make up the loss of the impounded river water due to evaporation.

The applicant states that, at Quad Cities, the natural topography of the intake flume, along with the weir gate located in the discharge canal, forms the UHS basin. The level in the basin stabilizes at elevation 565'-0", the high point of the intake flume. The RHRSW (evaluated with the RHRSW system and DGCW (evaluated with the DGSW system) take suction from the center compartment of the crib house at elevation 556'-6", below the UHS basin level. The pumps discharge to their assigned loads, and then to the discharge flume upstream of the weir. The gate on the ice-melt line is opened, allowing flow from the discharge flume back to the intake flume. The water impounded in the intake and discharge flumes is then used as an evaporative heat sink. With the loss of Dam No. 14 on the Mississippi River, river water would backflow through the 16-foot diameter discharge piping connecting the river to the discharge flume, to the downstream base of the weir gate. Portable diesel-driven pumps take suction from downstream of the weir and discharge into the center compartment of the crib house to make up the loss of the impounded river water due to evaporation.

In LRA Section 2.3.3.22, the applicant described the UHS system evaluation boundary. In addition, the applicant highlighted those portions of the UHS system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.22. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the UHS system in LRA Table 2.3.3-22 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary, Dresden only)
- piping and fittings (pressure boundary)
- pump casings (pressure boundary, Dresden only)
- valves (pressure boundary)
- stop logs (pressure boundary)—stop logs were initially inadvertently left out of the table.

2.3.3.22.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.22, Dresden UFSAR Sections 9.2.5 and 2.4, and Quad Cities UFSAR Sections 9.2.5 and 2.4 to determine whether there is reasonable assurance that the UHS system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the UHS system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the UHS system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the UHS system. The staff then reviewed the referenced P&I drawings to verify that those portions of the UHS system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.22, and that the applicant identified all UHS system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.22-1. In RAI 2.3.3.22-1, the staff requested the applicant to state whether the ice-melt gates, described in LRA Section 2.3.3.22 as necessary components to support UHS system intended function for Dresden and Quad Cities, are within the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with 10 CFR 54.21(a)(1). The staff further requested the applicant to provide justification if the ice-melt gates are not considered within the scope of license renewal and subject to an AMR. The basis for the staff's RAI is that the ice-melt gates are not clearly identifiable to the staff in LRA Table 2.3.3-22, which provides the AMR results for the UHS system.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.22-1 states that the ice-melt gates are included in LRA Table 2.3.3-22, under the component group "valves." Additionally, the "Dresden only" description should have been deleted from LRA Table 2.3.3-22 as shown below.

Table 2.3.3-22: Component Groups Requiring Aging Management Review—Ultimate Heat Sink

Component Group	Component Intended Function	Aging Management Ref
Valves	Pressure Boundary	3.3.2.278, 3.3.2.300

Based on its review, the staff finds the applicant's response to RAI 2.3.3.22-1 acceptable. The applicant acknowledges that the ice-melt gates are within the scope of the Rule and subject to an AMR, and that the ice-melt gates are included in LRA Table 2.3.3-22, subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.3.22-1 resolved.

RAI 2.3.3.22-2. In RAI 2.3.3.22-2, the staff requested the applicant to state whether stop logs are within the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with 10 CFR 54.21(a)(1), for Dresden. In LRA Section 2.3.3.22, the applicant indicates that, for Dresden, stop logs are necessary to isolate the center compartment of the crib house to allow the suction of the CCSW pumps to be flooded. Thus, stop logs appear to perform a pressure-boundary intended function for license renewal. However, in LRA Table 2.3.3-22, which contains the AMR results for the UHS system, the staff could not definitively locate an entry for stop logs. Therefore, the staff requested the applicant to provide additional information to verify that 10 CFR 54.4(a) and 10 CFR 54.21(a)(1) are satisfied.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.22-2 states that the stop logs are needed to support the Ultimate Heat Sink and should have been added to Table 2.3.3-22 and Table 3.3-2 as shown below.

Table 2.3.3-22 Component Groups Requiring Aging Management Review—Ultimate Heat Sink

Component Group	Component Intended Function	Aging Management Ref
Stop Logs (Dresden only)	Structural Pressure Barrier	3.3.2.304

Based on its review, the staff finds the applicant's response to RAI 2.3.3.22-2 acceptable because the applicant stated that the stop logs should have been added to Table 2.3.3-22 and Table 3.3-2 subject to an AMR and AMP. Therefore, the staff considers its concern described in RAI 2.3.3.22-2 resolved.

2.3.3.22.3 Conclusions

The staff reviewed LRA Section 2.3.3.22, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any structures, systems, or components that should be within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the UHS system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the UHS system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.23 Fuel Pool Cooling and Filter Demineralizer System

2.3.3.23.1 Summary of Technical Information in the Application

The applicant described the fuel pool cooling and filter demineralizer system in LRA Section 2.3.3.23 and provided a list of components subject to an AMR in LRA Table 2.3.3-23.

The purpose of the fuel pool cooling and filter demineralizer system is to remove heat from the spent fuel and to maintain fuel storage pool water clarity. During refueling operations, the fuel pool cooling and filter demineralizer system may be used to maintain the water clarity of the reactor refueling cavity also. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following fuel pool cooling and filter demineralizer system intended function:

- preclude adverse effects on safety-related SSCs - maintain sufficient integrity of components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The spent fuel pool cooling and filter demineralizer system which is a non-safety-related closed-loop system consists of two circulating pumps, two heat exchangers, two skimmer surge tanks, a filter, a deep-bed demineralizer, and the required piping, valves, and instrumentation. Water from the fuel storage pool overflows via scuppers and an adjustable weir into two crosstie skimmer surge tanks. The skimmer surge tanks drain into a common suction header for the fuel pool cooling pumps. Two parallel flow paths exist from the header, each with a fuel pool cooling pump taking suction from the header and discharging through a fuel pool cooling heat exchanger. Cooling water to the heat exchangers is supplied from the RBCCW system. A crosstie line exists on the pump discharge piping in order to operate either pump with either heat exchanger. The heat exchangers discharge into a common header that first flows through the fuel pool filter, and then through the fuel pool demineralizer. The fuel pool demineralizer discharges back into the fuel storage pool through two lines and spargers within the pool. The return lines to the fuel storage pool enter near the top and have openings in the piping about 6 in. below the pool surface to act as anti-siphon devices, to preclude uncontrolled draining of the pool during a pipe break. During refueling operations, the system may be aligned via manual valves to discharge into the reactor refueling cavity. The shutdown cooling system may be connected in parallel with the fuel pool cooling and filter demineralizer system during periods of extremely high heat loads, such as immediately after refueling or a full core discharge into the fuel storage pool. A clean demineralized water supply passes through a safety-related primary containment isolation valve that is part of the fuel pool cooling and filter demineralized system, to supply makeup water.

In LRA Section 2.3.3.23, the applicant described the evaluation boundary for the fuel pool cooling and filter demineralizer system. In addition, the applicant highlighted those portions of the fuel pool cooling and filter demineralizer system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.23. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the fuel pool cooling and filter demineralizer system in LRA Table 2.3.3-23 as being within the scope of license renewal and subject to an AMR for Dresden only:

- closure bolting (pressure boundary)
- piping and fittings (pressure boundary)
- piping and fittings (spatial interaction)
- sight glasses (spatial interaction)
- valves (pressure boundary)
- valves (spatial interaction)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of the fuel pool cooling and filter demineralizer system at Dresden were expanded and highlighted as shown on the revised boundary diagrams and an additional boundary diagram. Additional piping and components from the fuel pool cooling and filter demineralizer system at Dresden were added to the scope of license renewal.

At Quad Cities, the fuel pool cooling system was initially excluded from the scope of license renewal. However, the system has been added to the scope of license renewal as a result of the scoping methodology change due to the potential for spatial interaction with safety-related components in the same general area. The applicant provided boundary diagrams in the May 18, 2004 response to the draft SER Open Item 2.1-1 and highlighted those portions of the fuel pool cooling system in these boundary diagrams as within the scope of the Rule.

Fuel pool cooling filters, demineralizer, and skimmer surge tanks are not highlighted on the boundary diagrams for both Dresden and Quad Cities as within the scope of the Rule. These components reside in their own vaulted areas, physically isolated from safety-related equipment such that they can not spatially interact.

The in LRA Table 2.3.3-23, which previously listed component groups as being within the scope of license renewal and subject to an AMR at Dresden only, has been revised to include component groups as being within the scope of license renewal and subject to an AMR at both Dresden and Quad Cities.

Since the fuel pool cooling and filter demineralizer system is a non-safety-related system, regarding to the heat exchangers only the "Spatial Interaction" function requires aging management. Also, by a letter, dated June 22, 2004, the applicant clarified that the leakage boundary of these heat exchangers is comprised of the same materials and experiences the same environment as the component group evaluated under the "piping and fittings (spatial interaction)," therefore, the piping and fitting component group with spatial interaction listed in LRA Table 2.3.3-23 was revised to include heat exchanger as following:

- piping and fittings (spatial interaction) (includes heat exchanger shells)

In addition, the following new component group has been added to LRA Table 2.3.3-23 being subject to an AMR:

- pumps (spatial interaction)

2.3.3.23.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.23, Dresden UFSAR Section 9.1.3, and Quad Cities UFSAR Section 9.1.3 to determine whether there is reasonable assurance that the fuel pool *cooling and filter demineralizer system components within the scope of license renewal and* subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the fuel pool cooling and filter demineralizer system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the fuel pool cooling and filter demineralizer system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the fuel pool cooling and filter demineralizer system. The staff then reviewed the referenced P&I drawings to verify that those portions of the fuel pool cooling and filter demineralizer system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.23, and that the applicant identified all fuel pool cooling and filter demineralizer system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.3.23-1. The design objectives of the spent fuel pool cooling and cleanup system for Dresden Units 2 and 3 are to handle the spent fuel pool cooling load and to maintain pool water clarity. Spent fuel pool cooling pumps take suction from the skimmer surge tanks, circulate the warm pool water to the heat exchanger, filter, and demineralizer, and discharge the cooled water back to the spent fuel pool through two parallel lines (2-1910A-6"-K and 2-1910B-6"-K). In the Dresden Units 2 and 3 P&I drawings (LR-DRE-M-31 and LR-DRE-M-362), Exelon only highlighted the following:

- a portion of one (2-1910B-6"-K) of the two lines as within the scope of license renewal per 10 CFR 54.4(a)(2)—parallel line (2-1910A-6"-K) was not highlighted as within the scope of license renewal

- a portion of the drain line (from the globe valve, 3-1901-11, to the 6"x4" reducer), which collects the drains from the reactor well and the reactor well seal rupture drain, as within the scope of license renewal per 10 CFR 54.4(a)(2)

Exelon did not provide discussion to justify why only the above-cited portions of the spent fuel pool cooling and cleanup system are included in the scope of license renewal and subject to an AMR. The staff believes that the entire spent fuel pool cooling and cleanup system is within the scope of license renewal per 10 CFR 54.4(a)(2), and the passive and long-lived components of the system should be subject to an AMR. The staff asked the applicant to provide detailed discussion to clarify and justify why only the above-cited portions of the spent fuel pool cooling and cleanup system are included in the scope of license renewal and subject to an AMR.

Applicant's Response and Staff's Evaluation

The applicant stated that a plant walkdown determined the following:

- The red-highlighted portion of line 2-1910B-6"-K shown on boundary diagram LR-DRE-M-31 is in scope of license renewal because it is physically located such that leakage or spray from this line could spatially interact with safety-related primary containment isolation valve AOV 2-1601-23. Because of this spatial relationship, the highlighted portion of the line was determined to be in scope of license renewal per 10 CFR 54.4(a)(2). The pipe line 2-1910A-6"-K, which is shown as a parallel line on boundary diagram LR-DRE-M31, does not have a similar spatial relationship to any safety-related components. Consequently, it was not identified as within the scope of license renewal per 10 CFR 54.4(a)(2).

- The red-highlighted portion of the drain line (from globe valve 3-1901-11 to the 6"x4" reducer), as shown on boundary diagram LR-DRE-M-362, is physically located such that leakage from this line could spatially interact with safety-related primary containment isolation valve AOV 3-1601-23. Because of this spatial relationship, the highlighted portion of the line was determined to be in scope of license renewal per 10 CFR 54.4(a)(2).

The applicant further stated that Exelon does not consider the entire Dresden spent fuel pool cooling and cleanup system to be within the scope of license renewal per 10 CFR 54.4(a)(2). The fuel pool cooling and cleanup system is a non-safety-related closed-loop system that is normally in continuous operation. Except as discussed in the above paragraphs, the fuel pool cooling and cleanup system is not located near safety-related equipment that could be affected by failure of fuel pool cooling and cleanup system components. Thus, the Dresden fuel pool cooling system is not, in general, classified as a system within the scope of license renewal under the criterion of 10 CFR 54.4(a)(2).

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.23-1 acceptable because the fuel pool cooling and cleanup system is a non-safety-related closed-loop system that is normally in continuous operation, and the only intended function of the system is to preclude adverse effects from failure of segments of piping and components on safety-related SSCs. The staff agrees with the applicant that except as discussed in the above paragraphs, the Dresden fuel pool cooling and cleanup system is not located near safety-related equipment that could be affected by failure of fuel pool cooling and cleanup system components. Thus, only the segments of piping and components discussed above need to conform with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(2). Therefore, the staff considers its concern described in RAI 2.3.3.23-1 resolved.

RAI 2.3.3.23-2. In LRA Table 2.2-1, Exelon stated that because of differences in plant equipment layout, some of the fuel pool cooling system piping at Dresden can potentially fall in a way to cause failure of nearby safety-related equipment. A similar equipment layout does not exist at the Quad Cities plant.

The design objectives of the spent fuel pool cooling and cleanup system for the Quad Cities plant are to handle the spent fuel pool cooling load and to maintain pool water clarity. The staff believes that the entire spent fuel pool cooling and cleanup system is within the scope of license renewal per 10 CFR 54.4(a)(2), and the passive and long-lived components of the system should be subject to an AMR. The staff asked the applicant to provide detailed discussion to justify why the spent fuel pool cooling and cleanup system is not within the scope of license renewal per 10 CFR 54.4(a)(2), and the justification for excluding the passive and long-lived components of the system from an AMR.

Applicant's Response and Staff's Evaluation

The applicant stated that Exelon does not consider the Quad Cities spent fuel pool cooling and cleanup system to be within the scope of license renewal per 10 CFR 54.4(a)(2). The fuel pool cooling and cleanup system is a non-safety-related closed-loop system that is normally in continuous operation. A plant walkdown during scoping and screening did not identify any safety-related components that could be spatially affected by failure of Quad Cities fuel pool cooling and cleanup system piping or components. Thus, the Quad Cities fuel pool cooling system is not classified as a system within the scope of license renewal under the criterion of 10 CFR 54.4(a)(2).

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.23-2 acceptable because the Quad Cities spent fuel pool cooling and cleanup system is a non-safety-related closed-loop system that is normally in continuous operation, and the only intended function of the system is to preclude adverse effects from failure of segments of piping and components on safety-related SSCs. However, a plant walkdown by the applicant during scoping and screening did not identify any safety-related components that could be spatially affected by failure of Quad Cities fuel pool cooling and cleanup system piping or components. The staff agrees with the applicant that the Quad Cities fuel pool cooling system is not within the scope of license renewal under the criterion of 10 CFR 54.4(a)(2). Therefore, the staff considers its concern described in RAI 2.3.3.23-2 resolved.

2.3.3.23.3 Conclusions

The staff reviewed LRA Section 2.3.3.23, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the fuel pool cooling and filter demineralizer system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the fuel pool cooling and filter demineralizer system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.24 Plant Heating System

2.3.3.24.1 Summary of Technical Information in the Application

The applicant described the plant heating system in LRA Section 2.3.3.24 and provided a list of components subject to an AMR in LRA Table 2.3-24.

The purpose of the plant heating system is to supply steam for plant and area heating during cold weather periods, and for miscellaneous functions such as steam cleaning and carbon dioxide or nitrogen vaporizing. Additionally, the Dresden plant heating system supplies steam to the shutdown cooling system during its operation in the reactor heating mode.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following plant heating system intended function:

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The plant heating boiler feedwater pumps take suction from the heating system deaerating tank and discharge into the plant heating boilers. In addition, Quad Cities has a small, summer boiler with its own feedwater pumps taking suction from the deaerating tank. The boilers produce steam that flows into a common distribution header. The header discharges steam through a pressure control valve to various loops throughout the plant. Separate loops supply loads in each major building, such as the turbine buildings, reactor buildings, crib house, and radwaste building. From these loops, steam flows to loads such as ventilation heating coils, area space heaters, vaporizers, and steam drops for uses such as steam cleaning. The condensate from the loads passes through steam traps to condensate return units located in the major building areas. The condensate return units pump the condensate back to the heating system deaerating tank at Dresden, and to the condensate receiving tank at Quad Cities. At Quad Cities, the condensate receiving tank pumps then pump the condensate back to the deaerating tank. At Dresden, each reactor building heating steam supply loop also provides steam to its unit's shutdown heat exchangers (evaluated with the shutdown cooling system) for use in the reactor heating mode. As the steam supplied to the shutdown heat exchangers condenses, it drains via a steam trap to the reactor building equipment drain tank.

In LRA Section 2.3.3.24, the applicant described the plant heating system evaluation boundary. In addition, the applicant highlighted those portions of the plant heating system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.24. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the plant heating system in LRA Table 2.3.3-24 as being within the scope of license renewal and subject to an AMR:

- filters/strainers (spatial interaction)
- non-safety-related vents or drains, piping, and valves (spatial interaction, Dresden only)
- piping and fittings (spatial interaction)
- pumps (spatial interaction)
- sight glasses (spatial interaction, Quad Cities)
- tanks (spatial interaction)
- thermowells (spatial interaction,) (Dresden only)
- traps (spatial interaction)
- tubing (spatial interaction)
- valves (spatial interaction)

2.3.3.24.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.24 and various parts of the Dresden UFSAR and Quad Cities UFSAR regarding the plant heating system to determine whether there is reasonable assurance that the plant heating system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the plant heating system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the plant heating system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the plant heating system. The staff then reviewed the referenced P&I drawings to verify that those portions of the plant heating system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.24, and that the applicant identified all plant heating system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the plant heating system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.24, and that the plant heating system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-24. The staff did not identify any omissions.

2.3.3.24.3 Conclusions

The staff reviewed LRA Section 2.3.3.24 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the plant heating system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the plant heating system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.25 Containment Atmosphere Monitoring System

2.3.3.25.1 Summary of Technical Information in the Application

The applicant described the containment atmosphere monitoring (CAM) system in LRA Section 2.3.3.25 and provided a list of components subject to an AMR in LRA Table 2.3.3-25.

The CAM system provides the ability to monitor hydrogen, oxygen, and gross gamma radiation levels in the containment following a LOCA, and provides necessary indication and trip signals.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following intended CAM system functions:

- provide primary containment isolation
- support ESF function(s)
- preclude adverse effects on safety-related systems, structures and components
- credited in regulated events—components relied upon for compliance with 10 CFR 50.49 (EQ)

During CAM system operation, containment atmosphere is withdrawn through piping connected to primary containment penetrations for obtaining both a drywell and suppression chamber air sample. Hydrogen and oxygen concentration are measured outside the primary containment (evaluated with the primary containment structure) and the sample returned to the primary containment. The sample withdrawal lines in both cases are heat traced to prevent condensation in the sample lines which would cause measurement inaccuracies. A check valve is installed in the return discharge line for primary containment. In addition, a check valve is installed in each reagent and calibration gas line for primary containment. The containment atmosphere monitoring system consists of oxygen and hydrogen analyzer process instrumentation and various indication and annunciation instruments, primary containment monitoring panels, and gross gamma detector channels (from detector to annunciator and computer points). The system is automatically activated upon the occurrence of a LOCA, or manually by an operator. The system initiates a primary containment group 2 isolation on high radiation.

In LRA Section 2.3.3.25, the applicant described the evaluation boundary of the CAM system. In addition, the applicant highlighted those portions of the CAM and its structures and components that are within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.25. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the CAM system in LRA Table 2.3.3.25 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- filters/strainers (filter)

- flexible hoses (pressure boundary)
- NSR vents or drains, piping, and valves (structure integrity/attached support)
- piping and fittings (structure integrity/attached support)
- piping and fittings (pressure boundary)
- pumps (pressure boundary)
- restricted orifices (pressure boundary)
- sample pumps (pressure boundary)
- tubing (pressure boundary)
- valves (pressure boundary)
- valves (structure integrity/attached support)

2.3.3.25.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.25, Dresden UFSAR Sections 6.2.5.3.2 and 7.3.2.2.7, and Quad Cities UFSAR Section 6.2.5.2 to determine whether there is reasonable assurance that the CAM system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the CAM system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the CAM system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the CAM system. The staff then reviewed the referenced P&I drawings to verify that those portions of the CAM system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.25, and that the applicant identified all CAM system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

2.3.3.25.3 Conclusions

The staff reviewed LRA Section 2.3.3.25 and accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the CAM system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the CAM system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.26 Nitrogen Containment Atmosphere Dilution System

2.3.3.26.1 Summary of Technical Information in the Application

The applicant described the nitrogen containment atmosphere dilution (NCAD) system in LRA Section 2.3.3.26 and provided a list of components subject to an AMR in LRA Table 2.3.3-26.

The NCAD system provides two redundant, single failure proof, independent flow paths for purging the primary containment with nitrogen to provide postaccident combustible gas control. The NCAD system injects gaseous nitrogen into the primary containment to purge the containment of oxygen and hydrogen to maintain the mixture below combustible levels.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following intended NCAD system functions:

- support ESF function(s)—provides capability to maintain a nonexplosive atmosphere in the primary containment following a design basis accident (backup to nitrogen inerting system for post-LOCA operations (Quad Cities only))

The NCAD system is a manually operated system comprised of redundant flow paths. It is operated locally by opening a manual valve near the nitrogen supply equipment. The containment purge and vent valves can be aligned to inject nitrogen into the drywell or suppression chamber (evaluated with the primary containment structure) for either flowpath. At Quad Cities, the NCAD system is made up of two independent, redundant flowpaths for each unit. Each flow path in turn can supply gaseous nitrogen to either the drywell or suppression chamber. One flow path runs from the unit's corresponding electric vaporizer and taps back into the nitrogen inerting system piping just upstream of the nitrogen purge vaporization valve, on the non-safety-related side. The other flow path runs from the opposite unit's electric vaporizer and taps back into the normal nitrogen makeup system just upstream of the nitrogen makeup valve. Either flowpath can be supplied by the nitrogen atmospheric vaporizer. At Dresden, there is a normal and emergency supply line. The normal NCAD line begins with the drywell nitrogen purge and inerting system (DNPIS) (evaluated with the drywell nitrogen inerting system) connection downstream of the pressure regulating station at the discharge side of the makeup line atmospheric vaporizer; then, from the pressure regulating stations to the nitrogen supply header. The emergency NCAD line begins with the discharge of the nitrogen auxiliary tank and taps into the emergency truck connection upstream of the makeup line atmospheric vaporizer.

The NCAD system at Dresden includes the normal and emergency supply lines. The NCAD system at Quad Cities includes the two independent, redundant flow paths. All associated piping, components, and instrumentation contained within the flow paths and systems described above are included in the NCAD system.

In LRA Section 2.3.3.26, the applicant described the evaluation boundary of the NCAD system. In addition, the applicant highlighted those portions of the NCAD system and its structures and components that are within the scope of the Rule in the P&I drawings listed as reference in LRA Section 2.3.3.26. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the NCAD system in LRA Table 2.3.3.26 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- restricted orifices (pressure boundary, Dresden only)
- restricted orifices (throttle, Dresden only)
- tubing (pressure boundary)
- valves (pressure boundary)

2.3.3.26.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.26, Dresden UFSAR Section 6.2.5.3.3, and Quad Cities UFSAR Section 6.2.5.3 to determine whether there is reasonable assurance that the NCAD system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the NCAD system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the NCAD system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the NCAD system. The staff then reviewed the referenced P&I drawings to verify that those portions of the NCAD system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.26, and that the applicant identified all NCAD components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and

10 CFR 54.21(a)(1).

2.3.3.26.3 Conclusions

The staff reviewed LRA Section 2.3.3.26 and accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant.The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the NCAD system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the NCAD system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.27 Drywell Nitrogen Inerting System

2.3.3.27.1 Summary of Technical Information in the Application

The applicant described the drywell nitrogen inerting (DNI) system in LRA Section 2.3.3.27 and provided a list of components subject to an AMR in LRA Table 2.3.3-27.

The DNI system, also known as the DNPIS, is provided to maintain the drywell in a nitrogen inerted condition as a means of inhibiting the formation of a combustible gas mixture under LOCA conditions. The system is not safety- related; however, it can be used for post-LOCA hydrogen control. The system also serves as a backup to the pump-back system to maintain the required drywell-to-suppression chamber differential pressure and provide nitrogen to the NCAD system.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following intended NCAD system functions:

- supports ESF function(s)—reduces and maintains a low concentration of oxygen in the primary containment(can also be used, if available, for post-LOCA hydrogen concentration control)

- credited in regulated event(s)—credited in mitigation of the Appendix R fire event by establishing the inert drywell environment in which a design basis fire cannot occur

The DNI system consists of a liquid nitrogen storage tank, nitrogen vaporizers, associated piping, isolation valves, and pressure regulators. Nitrogen is supplied to three possible types of vaporizers. Steam powered vaporizers, which use plant heating steam (evaluated with plant heating system) to ensure supply temperatures do not damage nitrogen piping during periods of large demand, exist at both Dresden and Quad Cities, although Quad Cities typically uses electrically powered vaporizers installed for the same purpose. Additionally, each site has atmospheric vaporizers for periods of low demand. Flow regulating valves are also installed to limit low nitrogen supply temperatures. Nitrogen to the drywell is supplied through the drywell purge inlet line while air is vented to the reactor building ventilation system (evaluated with RBH-HVAC) or the standby gas treatment system (evaluated with standby gas treatment system). A similar method is used for inerting the suppression chamber. The containment is deinerted by admitting air into the containment as the containment atmosphere is vented to the reactor building ventilation system or the standby gas treatment system.

In LRA Section 2.3.3.27, the applicant described the evaluation boundary of the DNI system. In addition, the applicant highlighted those portions of the DNI system and its structures and components that are within the scope of the Rule in the P&I drawings listed as reference in LRA Section 2.3.3.27. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the DNI system in LRA Table 2.3.3.27 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- filter/strainers (pressure boundary, Dresden only)
- filter/strainers (filter, Dresden only)
- flow elements (pressure boundary)
- isolation barriers (pressure boundary)
- piping and fittings (pressure boundary)
- tanks/vaporizers (pressure boundary)
- thermowells (pressure boundary)
- traps (pressure boundary)
- tubing (pressure boundary)
- valves (pressure boundary)

2.3.3.27.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.27, and Dresden and Quad Cities UFSAR Sections 6.2.5, to determine whether there is reasonable assurance that the DNI system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the DNI system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the DNI system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the DNI system. The staff then reviewed the referenced P&I drawings to verify that those portions of the DNI system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.27, and that the applicant identified all DNI components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.3.3.27 identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant responses, dated October 3, 2003, are described below.

RAI 2.3.3.27-1. Nitrogen auxiliary tank 2/3-8554, shown on diagram LR-DRE-M-4215 in the drywell nitrogen inerting system, requires an AMR because this tank provides a pressure-retaining function for the safety-related components. Valve 2/3-8599-761 (D-7) and associated 1-inch line which connects to above tank is shown as not requiring an AMR. Also, valves 2/3-8599-807 and -803, and connecting pipe and muffler (E-6), are shown as not requiring an AMR. The staff asked the applicant to indicate where the LRA addresses the AMR of these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.27-1 stated that Exelon has reviewed boundary diagram LR-DRE-M-4215 for the DNI system and the following clarification is provided.

Valve 2/3-8599-761 (D-7) and its associated 1 in. line are in the scope of license renewal and are managed for aging. Boundary diagram LR-DRE-M-4215 should have highlighted this component within the scope of license renewal. Similarly, valves 2/3-8599-807 and 2/3-8599-803 and the connecting piping should have been highlighted indicating that they are within the scope of license renewal. The muffler and piping beyond the safety relief valve, 2/3-8599-803, are not in the scope of license renewal since these components do not support the pressure boundary intended function.

Aging management references for these components can be found in LRA Table 2.3.3-27 under the component group "valves" and "piping and fittings," with "pressure boundary" as the component intended function.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.27-1 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.27-1 resolved.

RAI 2.3.3.27-2. Nitrogen purge vaporizer 1/2-8713 is shown on diagram LR-QDC-M-34-3 (C-2) in the drywell nitrogen inerting system to require an AMR because this tank provides a pressure-retaining function for the safety-related components. Lines 1/2–57163 and 1/2 -57522 which connects to the vaporizer tank, are shown as not requiring an AMR. The staff asked the applicant to indicate where the LRA addresses the AMR of these components or provide a justification for excluding these components from an AMR.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.27-2 stated that boundary diagram LR-QDC-M-34-3 should have highlighted the piping as being within the scope of license renewal. LRA Section 2.3.3.24 addresses the aging management of lines 1/2-57522-3"-O and 1/2-57163-1 1/4"-O. Lines 1/2-57522-3"-O and 1/2-57163-1 1/4"-O to the steam vaporizer are within the scope of license renewal and have an intended function of "spatial interaction." LRA Table 2.3.3-24 includes the piping under the component group "piping and fittings (spatial interaction)."

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.27-2 acceptable because it conforms with the criteria set forth in 10 CFR 54.4 and 10 CFR 54.21(a)(1). Therefore, the staff considers its concern described in RAI 2.3.3.27-2 resolved.

2.3.3.27.3 Conclusions

The staff reviewed LRA Section 2.3.3.27, accompanying scoping boundary drawings, and the applicant's response to the RAIs, dated October 3, 2003, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the DNI system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the DNI system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.28 Safe Shutdown Makeup Pump System (Quad Cities Only)

2.3.3.28.1 Summary of Technical Information in the Application

The applicant described the safe shutdown makeup pump (SSMP) system in LRA Section 2.3.3.28 and provided a list of components subject to an AMR in LRA Table 2.3.3-28.

The function of the SSMP system, which is a common system to Unit 1 or Unit 2, is to provide cooling water to the reactor core in the event that the reactor becomes isolated from the main condenser simultaneously with a loss of the feedwater system. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following SSMP system intended functions:

- pressure boundary—maintains pressure boundary integrity at interface with HPCI system piping to support injection of cooling water to the reactor pressure vessel (RPV)

- credited for regulated event(s)—provides cooling water injection into the reactor pressure vessel credited for the mitigation of fire events in accordance with Appendix R to 10 CFR Part 50

The SSMP system consists of a motor-driven pump, associated valves, piping, and instrumentation. The preferred water source to the pump is the contaminated condensate storage tank (evaluated with the condensate and condensate storage system). An alternate source of makeup water is available from the fire header (evaluated with the FP system). The SSMP discharge is delivered to the reactor vessel (evaluated with the reactor vessel) via the HPCI system pump discharge line (evaluated with the HPCI system).

In LRA Section 2.3.3.28, the applicant described the SSMP system evaluation boundary. In addition, the applicant highlighted those portions of the SSMP system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.3.28. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the SSMP system in LRA Table 2.3.3-28 as being within the scope of license renewal and subject to an AMR:

- auxiliary and RW HVAC air handlers heating/cooling (pressure boundary)
- auxiliary and RW HVAC air handlers heating/cooling (heat transfer)
- closure bolting (pressure boundary)
- ducts and fittings, access doors, closure bolts, and equipment frames (pressure boundary)
- filters/strainers (pressure boundary)
- filters/strainers (filter)
- piping and fittings, including spectacle flanges (pressure boundary)
- pumps (pressure boundary)
- restricting orifices (pressure boundary)
- restricting orifices (throttle)
- valves (pressure boundary)

2.3.3.28.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.28 and Quad Cities UFSAR Section 5.4.6.5 to determine whether there is reasonable assurance that the SSMP system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with the Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the SSMP system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the SSMP system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the SSMP system. The staff then reviewed the referenced P&I drawings to verify that those portions of the SSMP system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.28, and that the applicant identified all SSMP system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

<u>RAI 2.3.3.28-1</u>. In RAI 2.3.3.28-1, the staff observed that boundary drawing LR-QDC-M-70 (B-8), SSMP system, shows a 2-inch pipe that is in scope (green) that comes from the SW system (LR-QDC-M-69-1, F-8) indicating that the water supply for the SSMP room cooler is supplied from SW. LRA scoping and screening results, Section 2.3.3.28, states that the SSMP room coolers are evaluated with the SW system, and LRA Section 2.3.3.16 states that the SW loads include the SSMP room cooler for Quad Cities. However, on SW scoping drawing LR-QDC-M-69-1(F-8), that portion of the SW system is not shown in scope.

Since the SW system shown on LR-QDC-M-69-1, which can supply SW to the SSMP system at the tie-in at F-7, is shown not in scope, the staff requested the applicant to identify the in-scope source of water for the SSMP room cooler and any resultant changes to Table 2.3.3-16 and affected AMPs.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.28-1 states that although SW is supplied to the SSMP room cooler during routine operation, the SW system is not credited for compliance with 10 CFR 50.48. When the room cooler is credited during a fire, the SW supply is isolated by closing valve 1/2-2901-25, and a fire water system source (evaluated in Section 2.3.3.5) is then provided by opening valve 1/2-2901-9 (see LR-QDC-M-70, coordinates B-8 and C-8). These valves are included in Table 2.3.3-28, under the component group "valves (Quad Cities only)."

The staff finds the applicant's response to RAI 2.3.3.28-1 acceptable because the SW system is not credited for compliance with 10 CFR 50.48. When the room cooler is credited during a fire, the SW supply is isolated and a fire water system source is then provided. The fire water system source is the within scope water source for the SSMP room cooler and is evaluated under LRA Section 2.3.3.5. Therefore, the staff finds the applicant's response acceptable and considers its concern described in RAI 2.3.3.28-1 resolved.

RAI 2.3.3.28-2. The staff observed that the license renewal boundary drawing LR-QDC-M-70 (B-8), SSMP system, shows a 2 in. pipe that is in scope (green) that goes to the SW system (LR-QDC-M-69-1, D-6) indicating that the water return from the SSMP room cooler goes to the SW system and eventually to the circulating water system (LR-QDC-M-28-1, D-5). LRA scoping and screening results, Section 2.3.3.28, states that the SSMP room coolers are evaluated with the SW system. However, on LR-QDC-M-69-1(D-6), the SW system piping from the tie-in from the SSMP system to the tie-in to the circulating water system is shown not in scope.

Service water, as shown on LR-QDC-M-69-1, from where the pipe from the SSMP ties in at D-6 to where it goes to the circulating water system (LR-QDC-M-28-1, D-5) at G-6, is not shown in scope. The staff requested the applicant to identify the in-scope water discharge path for the SSMP room cooler and any resultant changes to Table 2.3.3-16 and affected AMPs.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.28-2 states that although SW is supplied to the SSMP room cooler during routine operation, the SW system is not credited for compliance with 10 CFR 50.48. When the room cooler is credited during a fire, the SW supply is isolated, and a fire water system source is then provided. The room cooler cooling water discharge piping is not reconfigured during a fire. The discharge line (line 1/2-2908-2"-L) exits the SSMP room and connects to the SW discharge line from the 0-4709 instrument air compressor (line 0-39115-2"-O), which in turn discharges into the Unit 2 42" standpipe (line 2-4407-42"-L). The standpipe then connects to the discharge flume via the Unit 2 circulating water discharge piping. Only the SSMP room cooler discharge piping and components within the SSMP room, as highlighted on boundary diagram LR-QDC-M-70, are within the scope of license renewal. The SSMP room cooler discharge piping and components are evaluated in LRA Section 2.3.3.28, "Safe Shutdown Makeup Pump System (Quad Cities Only)," and are included in Table 2.3.3-28, under component groups "piping and fittings (Quad Cities only) (includes spectacle flanges)" and "valves (Quad Cities only)," with component intended functions of "pressure boundary." The loss of the component function of "pressure boundary" for cooling water discharge piping and components outside of the SSMP room would not prevent the SSMP system from performing its intended functions.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.28-2 acceptable because the SSMP room cooler water discharge piping is not a safety-related component and a failure of the component outside of the SSMP room would not prevent the SSMP system from performing its intended functions. A failure of the pipe inside the SSMP room could prevent the SSMP system from performing its intended functions; this section of the pipe is within the scope of license renewal and the piping and components are included in LRA Table 2.3.3-28, subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.3.28-2 resolved.

RAI 2.3.3.28-3. In RAI 2.3.3.28-3, the staff identified that the boundary diagram LR-QDC-M-70 depicts the safe shutdown makeup system. At grid location F-2, piping line 1-2905-4"-B is shown as continuing at grid location D-9 on diagram LR-QDC-M-46-1. Although the staff examined diagram LR-QDC-M-46-1, this line could not be located. In the place where the staff expected to find the SSMP system discharge line (based upon the staff's examination of LR-QDC-M-87-1), an end-capped line is depicted on LR-QDC-M-46-1. The staff requested the applicant to clarify where the SSMP system discharge line connects to the high pressure injection system discharge line, so that the staff may verify that the LR scoping boundaries for this system comply with 10 CFR 54.4(a).

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.28-3 states that when the SSMP system was initially installed at Quad Cities, the SSMP discharged into the HPCI pump discharge line on both units. The HPCI pump discharge line connects into the "B" reactor feedwater line on both units. A recent modification on Unit 1 moved the SSMP discharge line to connect directly into the "B" reactor feedwater line and capped the stub where it used to connect to the HPCI pump discharge line.

Quad Cities UFSAR Section 5.4.6.5, "Safe Shutdown Makeup Pump System," and LRA Section 2.3.3.28, "Safe Shutdown Makeup Pump System (Quad Cities Only)," accurately describe the different flow paths for the two units, but because of the timing of the modification installation and issuance of the "For Record" drawings, not all LR boundary diagrams associated with the SSMP system reflected the change in the Unit 1 flow path prior to issuance of the LRA to the NRC. The continuation flag for line 1-2905-4"-B on LR-QDC-M-70, coordinate F-2, should point to M-15-1 (LR-QDC-M-15-1), coordinate F-1. LR-QDC-M-15-1, coordinate F-1, should show line 1-2905-4"-B continuing from M-70 (LR-QDC-M-70) and connecting to the "B" reactor feedwater line between the discharge side of check valve 1-0220-59B and the HPCI line 1-2304-14"-C connection to the "B" reactor feedwater. LR-QDC-M-46-1 correctly depicts the capped line for the original connection to the HPCI line.

Based on its review of the applicant's clarification discussed above, the staff finds its response to RAI 2.3.3.28-3 acceptable because the inconsistency between the drawings and the system description is caused by an outdated drawing. The current drawing is in accordance with the system description given in the LRA. All the system components in the scope of license renewal were identified in the system description in accordance with the criteria set forth in 10 CFR 54.4(a). Therefore, the staff considers its concern described in RAI 2.3.3.28-3 resolved.

RAI 2.3.3.28-4. The LRA includes flow elements as an individual entry in the AMR results tables for many of the systems in which they are depicted as being within the scope of license renewal on the associated LR boundary diagrams (e.g., DWM system and CCSW system). However, for the SSMP system, the AMR results in LRA Table 2.3.3-28 do not include an entry for flow elements, despite the fact that they are depicted as being within scope on boundary diagram LR-QDC-M-70 (grid location D-5). Therefore, in light of the screening criteria set forth in 10 CFR 54.21(a)(1), the staff requested the applicant to provide the basis for not including flow elements as an entry in LRA Table 2.3.3-28.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.28-4 states that there are four components in the SSMP system with an assigned plant component type of "flow element." These four components are included in different component groups in LRA Table 2.3.3-28. Refer to boundary diagram LR-QDC-M-70.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.28-4 acceptable because the flow elements cited above were identified as being within scope of license renewal in accordance with the criteria set forth in 10 CFR 54.4(a) and were included in different component groups in LRA Table 2.3.3-28. Therefore, the staff considers its concern described in RAI 2.3.3.28-4 resolved.

RAI 2.3.3.28-5. In RAI 2.3.3.28-5, the staff identified that on boundary diagram LR-QDC-M-70 (grid location F-4), a segment of piping connected to in-scope piping is not highlighted as being within the scope of license renewal. This segment of piping is part of a piping line that is highlighted as being within the scope of license renewal on either side of the unhighlighted segment, and there are no valves or other pressure boundaries that isolate the unhighlighted segment. It is not apparent to the staff why the unhighlighted segment of piping is not considered to be within scope to ensure that the in-scope portions of the piping line are capable of performing their intended function for license renewal. Therefore, in light of 10 CFR 54.4(a), the staff requested the applicant to provide the basis for not including the unhighlighted piping segment within the scope of license renewal.

Applicant's Response and Staff's Evaluation

The applicant's response to RAI 2.3.3.28-5 states that the piping segment in question on LR-QDC-M-70 (F-4) is actually an instrument electrical lead. See LR-QDC-M-12-2 (E-7) for a clarification of boundary diagram symbols. It was correct not to highlight the questioned section. There are more sections of instrument electrical leads on LR-QDC-M-70 that are highlighted, but which should not have been. One example is the connection between the motor operators for MO 2-2901-08 (C-3), MO 1-2901-08 (D-3), and MO ½-2901-07 (E-4). When creating boundary diagrams for mechanical systems, it was the convention not to highlight instrument electrical leads. Based on this, LR-QDC-M-70 should not have highlighted the instrument electrical leads.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.3.28-5 acceptable because the component cited above is an electrical lead and not a mechanical component. The applicant also stated that other electrical leads were wrongfully highlighted. Component support commodity groups for the SSMP system and electrical components that support the operation of the SSMP system are described in LRA Sections 2.4.15 and 2.4.16. Therefore, the staff considers its concern described in RAI 2.3.3.28-5 resolved.

2.3.3.28.3 Conclusions

The staff reviewed LRA Section 2.3.3.28 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the SSMP system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the SSMP system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.29 *Circulating Water System*

Resulting from the revised scoping methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, portions of the circulating water systems at Dresden and Quad Cities were added to the scope of license renewal. Previously, these systems were not included in the original license renewal application. The circulating water (CW) system is a non-safety-related system that could spatially interact with portions of the safety-related emergency diesel cooling water system at both sites. At Quad Cities, only the Unit 1 CW system can spatially interact with safety-related components; therefore, it is the only system which is added to the scope of license renewal for Quad Cities. Thus, the applicant created LRA Section 2.3.3.29 (to address the CW systems for Dresden Units 2 & 3 and Quad Cities Unit 1) for NRC staff review.

2.3.3.29.1 Summary of Technical Information in the Application

The applicant described the CW system in LRA Section 2.3.3.29 and provided a list of components subject to an AMR in LRA Table 2.3.3-29.

The primary function of the CW system is to remove the heat rejected from the main condenser. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following CW system intended functions:

- Preclude adverse effects on safety-related SSCs– Non-safety-related components that could be a hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

At Dresden, the CW system takes supply from the Dresden cooling lake (with makeup from Kankakee River) or directly from the Kankakee River, directs the flow through the main condenser, and discharges it back to the Dresden cooling lake and/or the Illinois River system. Whereas at Quad Cities, the CW system takes suction directly from the Mississippi River, discharges the flow through the condenser, and directs it back to the river.

The CW system on each unit has three vertical, drypit, centrifugal, removable element CW pumps which deliver water from the crib house intake to the condenser water boxes. Each pump suction is sectionalized to permit dewatering of one pit for maintenance while the remaining two pumps are in operation. Upstream of each CW pump there is a bar-grille trash rack with a rake for periodic removal of river debris followed by traveling screens for removal of debris. Each pump is provided with a shutoff valve at its discharge. At the condenser pit the CW pipe becomes a supply header to the main condenser.

The applicant described the evaluation boundary for the CW system in LRA Section 2.3.3.29. In addition, the applicant highlighted on the P&I drawings those portions of the CW system that are within the scope of the Rule. These drawings are listed as "License Renewal Boundary Diagram References" in the LRA Section 2.3.3.29. Also, based on the methodolgy described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the CW system in LRA Table 2.3.3-29 as being within the scope of license renewal and subject an AMR:

- Piping and fittings (spatial interaction)
- Valves (spatial interaction)
- Pumps (spatial interaction - Dresden only)

2.3.3.29.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.29, Dresden UFSAR Section 10.4.5, and Quad Cities UFSAR Section 10.4.5 to determine whether there is reasonable assurance that the CW system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the CW system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the CW system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs. The staff then reviewed the referenced P&I drawings to verify that those portions of the CW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.29, and that the applicant identified all CW system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the CW system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.29. The CW system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-29. The staff did not identify any omissions.

2.3.3.29.3 Conclusions

The staff reviewed LRA Section 2.3.3.29 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the CW system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the CW system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.30 *Dresden Laundry Treatment System*

Resulting from the revised scoping methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, a portion of the laundry waste treatment system at Dresden was added to the scope of license renewal. Non-safety-related laundry waste treatment system piping could spatially interact with safety-related electrical switchgear at Dresden. As a result, Section 2.3.3.30, Laundry Waste Treatment System has been created (for Dresden only) by the applicant and submitted for NRC staff review. Previously, this system was not included in the original license renewal application.

2.3.3.30.1 Summary of Technical Information in the Application

The applicant described the laundry waste treatment system in LRA Section 2.3.3.30 and provided a list of components subject to an AMR in LRA Table 2.3.3-30.

The function of the laundry waste treatment system is to collect potentially radioactive water for liquid radwaste processing. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following laundry waste treatment system intended functions:

- Preclude adverse effects on safety-related SSCs – Non-safety-related components that could be a hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

At Dresden, the laundry drain tank of the laundry waste treatment system collects liquid waste generated from the laundry facility which includes the Dresden Unit 1 laundry room, the maintenance shop floor drains, and the access control building personnel decontamination station drains. The liquid waste is pumped to the Dresden Unit 2/3 liquid radwaste system for sampling.

The applicant described the evaluation boundary for the laundry waste treatment system in LRA Section 2.3.3.30. In addition, the applicant highlighted those portions of the laundry waste treatment system within the scope of the Rule on the P&I drawing listed as references in the LRA Section 2.3.3.30. Also, based on the methodolgy described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the laundry waste treatment system in LRA Table 2.3.3-30 as being within the scope of license renewal and subject to an AMR:

- Piping and fittings (spatial interaction - Dresden only)

According to the applicant, while the laundry waste treatment system includes the laundry accumulator tank, drain tank vault sump eductor, laundry drain tank, laundry drain pump, and associated piping, valves and instruments, only discharge piping transferring water to radwaste is located in the same general area that includes safety-related electrical switchgear. For that reason, only piping and fittings require aging management.

2.3.3.30.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.30 and Dresden UFSAR Section 1.2.4.4.11 to determine whether there is reasonable assurance that the laundry waste treatment system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the laundry waste treatment system in the LRA. The staff did not identify any omissions.

The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the laundry waste treatment system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawing to the system drawing in the UFSAR to ensure that the referenced P&I drawing was representative of the laundry waste treatment system. The staff then reviewed the referenced P&I drawing to verify that those portions of the laundry waste treatment system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.30, and that the applicant identified all laundry waste treatment system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the laundry waste treatment system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.30. The laundry waste treatment system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-29. The staff did not identify any omissions.

2.3.3.30.3 Conclusions

The staff reviewed LRA Section 2.3.3.30 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the laundry waste treatment system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the laundry waste treatment system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.31 *Zinc Injection System*

Resulting from the revised scoping methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the zinc injection system at both sites was added to the scope of license renewal. Previously, this system was not included in the original license renewal application. The zinc injection system is a non-safety-related system that could spatially interact with safety-related piping. As a result, Section 2.3.3.31, Zinc Injection System has been created by the applicant and submitted for NRC staff review.

2.3.3.31.1 Summary of Technical Information in the Application

The applicant described the zinc injection system in LRA Section 2.3.3.31 and provided a list of components subject to an AMR in LRA Table 2.3.3-31.

The function of the zinc injection system is to reduce the amount of Cobalt-60 buildup on recirculation piping in the primary containment and reduce dose rates in the drywell during outages. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following zinc injection system intended functions:

- Preclude adverse effects on safety-related SSCs – Non-safety-related components that could be a hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

The zinc injection system is mounted on a skid near the reactor feedwater pumps. A tap on the feedwater pump discharge header provides flow to a vessel on the skid which contain zinc oxide pellets and returns to the feedwater pump suction header. The driving force for the injection is the differential pressure between the discharge and suction of the feedwater pumps. The zinc oxide dilution rate is controlled by varying the flow through the skid with a manually operated flow control valve.

The applicant described the evaluation boundary for the zinc injection system in LRA Section 2.3.3.31. In addition, the applicant highlighted on the P&I drawings those portions of the zinc injection system that are within the scope of the Rule. These drawings are listed as "License Renewal Boundary Diagram References" in the LRA Section 2.3.3.31. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the zinc injection system in LRA Table 2.3.3-31 as being within the scope of license renewal and subject an AMR:

- Piping and fittings (spatial interaction)(includes dissolution columns, strainers and flow elements)
- Tubing (spatial interaction)
- Valves (spatial interaction)

The licensee included the dissolution columns, strainers, and flow elements to LRA Table 2.3.3-31 as part of the piping and fittings for aging management, because the leakage boundary for these components is comprised of the same material and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" group.

2.3.3.31.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.31, Dresden UFSAR Section 5.4.3.7, and Quad Cities UFSAR Section 10.4.7.2 to determine whether there is reasonable assurance that the zinc injection system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of the NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the zinc injection system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the zinc injection system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the zinc injection system. The staff then reviewed the referenced P&I drawings to verify that those portions of the zinc injection system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.31, and that the applicant identified all zinc injection system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the zinc injection system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.3.31. The zinc injection system components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.3-31. The staff did not identify any omissions.

2.3.3.31.3 Conclusions

The staff reviewed LRA Section 2.3.3.31 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the zinc injection system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the zinc injection system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4 Steam and Power Conversion Systems

The steam and power conversion systems consist of the main steam, feed water, condensate and condensate storage systems, main condenser, main turbine and auxiliaries, turbine oil (Quad Cities only), and main generator and auxiliaries (Quad Cities only), and the associated components.

2.3.4.1 Main Steam System

2.3.4.1.1 Summary of Technical Information in the Application

The applicant described the main steam system in LRA Section 2.3.4.1 and provided a list of components subject to AMR in LRA Table 2.3.4-1.

The function of the main steam system is to direct steam from the reactor pressure vessel to the main turbine and balance of plant auxiliary steam loads. In performing this function, it serves as part of the primary boundary to prevent radioactive release to the surrounding environment. The system also provides the ability to bypass steam directly to the main condenser, and provides overpressure protection for the reactor vessel.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following main steam system intended functions:

- pressure boundary—maintains the integrity of the reactor coolant pressure boundary and provides steam-line isolation to support the reactor coolant pressure boundary

- core cooling—in conjunction with the automatic depressurization system, supports emergency core cooling by depressurizing the reactor pressure vessel as required to support low pressure coolant injection and core spray operation

- overpressure protection—provides overpressure protection in transient or accident events that increase pressure in the reactor pressure vessel

- primary containment isolation—provides containment isolation for those portions of the system that interface with the primary containment

- supports ESF function(s)—provides process signals for initiation of ESF functions, limits coolant inventory loss rate in some LOCA events, and (at Quad Cities only) provides steam supply for operation of the HPCI and RCIC systems

- credited in regulated event(s)—provides overpressure protection, reactor vessel isolation capability, and pressure control capability credited in mitigation of the Appendix R fire, ATWS, and SBO events (The system also contains components that are relied upon for compliance with 10 CFR 50.49, (EQ).)

- post accident plateout of MSIV seat leakage—provides surfaces for plateout of iodine releases resulting from MSIV bypass leakage

- limit steam line flow—limits potential radioactive release by restricting steam flow during a steam line rupture outside of primary containment: flow is also limited to ensure integrity of dryers in order to prevent restriction of MSIV closure

- steam flow measurement—provides main steam flow input for primary containment isolation

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The main steam system consists of four main steam lines that deliver steam from the reactor to the main turbine. Each line is equipped with safety valves, at least one relief valve, a venturi-type flow restrictor, followed by an MSIV inside and outside the primary containment. Also connected to the main steam lines are tail pipes to the suppression pool for the safety/relief valves, main steam line drain piping, turbine main stop and bypass valves, and the associated main steam bypass piping to the condenser.

At Dresden, the main steam system downstream of the outboard isolation valve is described in Section 10.3 of the Dresden UFSAR. In addition to providing steam to drive the main turbine, it also provides steam to the turbine gland seal system, steam jet air-ejectors, off-gas recombiner system, main condenser low load reheat coils, and the liquid radwaste reboiler. The system can be aligned to bypass the main turbine via bypass valves to the main condenser when required. This is done by directing steam from the turbine bypass manifold, through nine 8-inch lines connected to the turbine bypass valves, which discharge to the main condenser. Drains are provided at several locations along the main steam system to drain condensate from the line and return it to the condenser.

At Quad Cities, the main steam system supplies steam to the main turbine, the turbine gland seal system, steam jet air-ejector system, booster air ejector (2B train only), off-gas preheater, and the condenser low load reheat coil supply. Also, it supplies steam to the HPCI and RCIC pump turbines as described in LRA Section 2.3.4.1. The main steam system downstream of the outboard isolation valve is described in Section 10.3 of the Quad Cities UFSAR. Low points of each of the main steam lines are provided with drains through a valved line to the main condenser.

In LRA Section 2.3.4.1, the applicant described the main steam system evaluation boundary. In addition, the applicant highlighted those portions of the main steam system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.1. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the main steam system in LRA Table 2.3.4-1 as being within the scope of license renewal and subject to an AMR:

- accumulators (pressure boundary)
- closure bolting (pressure boundary)
- dampeners (pressure boundary, Quad Cities only)
- filters/strainers (filter, Quad Cities only)
- flexible hoses (pressure boundary)
- flow elements (pressure boundary)
- NSR vents or drains, piping, and valves (spatial interaction)
- NSR vents or drains, piping, and valves (structural integrity/attached support)
- piping and fittings (pressure boundary)
- small bore piping and fittings (pressure boundary)
- restricting orifices (pressure boundary)
- rupture discs (pressure boundary)
- tanks (pressure boundary, Quad Cities only)
- thermowells (pressure boundary)
- tubing (structural integrity/attached support)
- vacuum breakers (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached support, Dresden only)

Resulting from the revised methodology described in the May18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of non-safety-related sections of the main steam system at Dresden and Quad Cities were expanded and highlighted as shown on the revised boundary diagrams, and the new boundary diagrams added for Quad Cities. Additional piping components associated with main steam instrumentation racks that contain small bore piping and tubing that could spatially interact with safety-related equipment in the same general area was added to the scope of license renewal for both Dresden and Quad Cities. Walkdowns of the turbine building at Dresden identified several main steam lines which supply steam to the radwaste reboiler routed in the same general areas containing safety-related components. The main steam line piping and associated components located in these areas were also added to the scope of license renewal due to potential spatial interaction with safety-related equipment. Quad Cities does not have a radwaste reboiler subsystem. As such, the scoping of the main steam supply lines to the radwaste reboiler only applies to Dresden.

The applicant identified the following additional component groups and their intended functions within the main steam system as being within scope of license renewal, and added them to LRA table 2.3.4.1.

- Piping and Fittings (spatial interaction)
- Tubing (spatial interaction)
- Valves (spatial interaction)

2.3.4.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.1, Dresden UFSAR Section 10.3, and Quad Cities UFSAR Section 10.3 to determine whether there is a reasonable assurance that the main steam system components within the scope of license renewal and subject to AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with the Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the main steam system in the LRA.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that the components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the main steam system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the main steam system. The staff then reviewed the referenced P&I drawings to verify that those portions of the main steam system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.1, and that the applicant identified all main steam system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.4.1-1. UFSAR Section 15.6.5.5 contains a discussion of the radiological dose analysis performed for the control room in accordance with guidance of NUREG-0737, Item III.D.3.4. Credit is taken for iodine plateout on surfaces of steam lines and condenser and radioactive decay prior to release. In assessing radioactive releases via the MSIV leakage pathway, MSIV leakage is assumed to pass through three different volumes which provide holdup and plateout. The volumes are the main steam piping section between the inboard and outboard isolation valves, the piping between the outboard isolation valves and the turbine stop valves, and the piping between the turbine stop valves and the turbine condenser complex. The licensee has identified postaccident plateout of MSIV seat leakage as a system intended function of the main steam system. The staff believes that in addition to the plateout function, the main steam system also provides for postaccident containment and holdup of MSIV bypass leakage, and that pressure boundary integrity for portions of the main steam system that are required to contain bypass leakage must be maintained during the postaccident period. The staff askerd the applicant to clarify whether postaccident containment and holdup should be included as an intended function for the main steam system, and if not, please provide justification for its exclusion.

Applicant's Response and Staff's Evaluation

The main steam system intended function, identified in Section 2.3.4.1 of the LRA as "Post accident plateout of MSIV seat leakage," should have read as follows:

Post accident holdup and plateout of MSIV seat leakage—provides volumes for holdup and surfaces for plateout of elemental and particulate iodine resulting from MSIV bypass leakage

Based on its review, the staff finds the applicant's response acceptable because the applicant revised the intended function to clearly include post accident holdup and plateout of MSIV seat leakage. Therefore, the staff considers its concern described in RAI 2.3.4.1-1 resolved.

RAI 2.3.4.1-2. As stated in RAI 2.3.4.1-1, the staff believes that post accident containment, plateout, and holdup of MSIV bypass leakage is a system intended function of the main steam system. Therefore, the SSCs necessary to ensure this intended function are in scope of license renewal per 10 CFR 54.4(a). Hence, the steam drain lines and turbine bypass piping should be in scope of license renewal and subject to an AMR. License renewal boundary drawings LR-DRE-M-12-2, LR-DRE-M-345-2, LR-QDC-M-13-2, and LR-QDC-M-60-2 indicate that turbine bypass piping from the main steam line equalization header to the condenser, and the main steam piping from the equalization header up to and including the main steam stop valves, are not in scope. The staff asked the applicant to provide a justification for the exclusion of these sections of main steam system piping and their associated components.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.1-2, the applicant agreed that the subject sections of piping and their components are within the scope of license renewal, and identified the applicable revisions to boundary drawings LR-DRE-M-12-2, LR-DRE-M-345-2, LR-QDC-M-13-2, and LR-QDC-M-60-2. In addition, the applicant stated that these changes will result in additional main steam line piping and fittings, valves, and restricting orifices being added to the scope of license renewal with an intended function of "containment, hold up and plateout." These newly identified components are the same types of components as have already been evaluated and will be included in the AMPs currently applicable for the main steam system piping and piping components. The applicant further stated that LRA Table 2.3.4-1 should have included these additional components and their corresponding intended functions as subject to an AMR.

Based on its review, the staff finds the applicant's response acceptable because the applicant has (1) added the main steam line bypass piping sections to the scope of license renewal in accordance with the criteria set forth in 10CFR 54.4, and (2) acknowledged that LRA Table 2.3.4-1 should have included these additional components and their corresponding intended functions subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.4.1-2 resolved.

RAI 2.3.4.1-3. The main steam line drain lines provide an MSIV leakage pathway to the condenser which has an intended function of postaccident containment, holdup, and plateout of MSIV bypass leakage. Therefore, the main steam drain piping from the main steam line to the condenser is in scope of license renewal per 10 CFR 54.4(a). However, only the Dresden Unit 2 boundary drawing shows the entire drain line to the condenser as being in scope of license renewal. Dresden Unit 3, and Quad Cities Units 1 and 2, shows only drain line sections on drawings LR-DRE-M-345-2, LR-QDC-M-13-2, and LR-QDC-M-60-2, respectively, as being in scope of license renewal. A review of these drawings indicate that the drain lines are continued on Dresden Unit 3 drawing M-370, and Quad Cities drawings M-26 and M-73 for Units 1 and 2, respectively. The staff believes that the main steam drain line section that goes to the condenser, shown on the above-mentioned drawing, should be included as in scope of license renewal. The staff asked the applicant to provide a justification for the exclusion of the main steam drain line piping shown on drawing LR-DRE-M-370, and Quad Cities drawings M-26 and M-73, for which no boundary drawings were provided. The staff also asked the applicant whether boundary drawings exist for Quad Cities drawings M-26 and M-73, and, if so, to provide these drawings.

Applicant's Response and Staff's Evaluation

The applicant agreed that the continuation of the in-scope drain line to its point of interface with the main condenser is within the scope of license renewal and has identified the applicable revisions to boundary drawings LR-DRE-M-345-2, LR-QDC-M-13-2, and LR QDC-M-60-2. In addition, the applicant stated that these changes will result in additional main steam line piping and fittings with an intended function of "containment, hold up and plateout" being added to LRA Table 2.3.4-1 as being within the scope of license renewal and subject to an AMR. This newly identified piping is the same type of piping that has already been evaluated and is included in the AMPs currently applicable for the main steam system piping. The applicant further stated that LRA Table 2.3.4-1 should have included the additional piping and fittings and their corresponding intended functions as subject to an AMR.

Based on its review, the staff finds the applicant's response acceptable because the applicant has identified and included additional main steam line piping in the boundary drawings as within the scope of license renewal and subject to an AMR, and has stated that additional main steam line piping and fittings with an intended function of "containment, hold up and plateout" are being added to LRA Table 2.3.4-1 as being subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.4.1-3 resolved.

RAI 2.3.4.1-4. Acoustic flow sensoring devices, flow elements FE-261-60A and FE-261-60D, on boundary drawing LR-DRE-M-12-1, for Dresden Unit 2, are not shown to be within scope. However, the corresponding devices for the B and C steam lines, flow elements FE-261-60B and FE-261-60C, are included in scope. The staff asked the applicant to provide justification for the exclusion of these components.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.1-4, the applicant stated that boundary diagram LR-DRE-M-12-1 should have highlighted acoustic flow sensing devices, flow elements 2-261-60A and 2-261-60D. Flow elements 2-261-60A and 2-261-60D are within the scope of license renewal.

Based on its review, the staff finds the applicant's response to RAI 2.3.4.1-4 acceptable because the two flow elements, 2-261-60A and 2-261-60D, are identified as being in scope of license renewal and subject to an AMR, and they were inadvertently not highlighted in the LR boundary diagram. Therefore, the staff considers its concern described in RAI 2.3.4.1-4 resolved.

RAI 2.3.4.1-5. The portion of the safety relief valve (SRV) discharge lines inside the wetwell, and their associated T-quenchers, are not identified as in scope in Dresden drawings LR-DRE-M-25 and LR-DRE-M-356. In addition, the T-quenchers for Dresden or Quad Cities have not been included in Table 2.3.4-1. The staff believes that the SRV discharge lines and T-quenchers are in scope of license renewal per 10 CFR 54.4(a)(1). The staff asked the applicant to provide a justification for exclusion of these components.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.1-5, the applicant stated that the complete SRV discharge lines and the associated T-quenchers shown on boundary diagrams LR-DRE-M-25 and LR-DRE-M-356 should have been highlighted. The SRV discharge lines and T-quenchers are within the scope of license renewal. The SRV discharge lines and T-quenchers were not explicitly called out, but they are included in LRA Table 2.3.4-1 under component group "piping and fittings."

Based on its review, the staff finds the applicant's response to RAI 2.3.4.1-5 acceptable because the complete SRV discharge lines and their associated T-quenchers are identified as being in scope of license renewal and subject to an AMR, and they were inadvertently not highlighted in the LR boundary diagram. And also, because the components associated with the SRV discharge lines and T-quenchers are included in LRA Table 2.3.4-1 under component group "piping and fittings." Therefore, the staff considers its concern described in RAI 2.3.4.1-5 resolved.

2.3.4.1.3 Conclusions

The staff reviewed LRA Section 2.3.4.1 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the main steam system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the main steam system that are subject to an AMR, as required by 10 CFR 54.4(a)(1).

2.3.4.2 Feedwater System

2.3.4.2.1 Summary of Technical Information in the Application

The applicant described the feedwater system in LRA Section 2.3.4.2 and provided a list of components subject to AMR in LRA Table 2.3.4-2.

The function of the feedwater system is to deliver condensate from the condenser to the reactor at a rate of water equivalent to what is being generated into steam by boil-off and removal by the main steam system. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following feedwater system intended functions:

- flowpath—provide flowpath into the reactor pressure vessel for high pressure coolant injection, reactor water cleanup, and, for Quad Cities only, reactor core isolation cooling and safe shutdown makeup pump flow

- pressure boundary—maintain the integrity of the reactor coolant pressure boundary

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The feedwater system is a two train system consisting of the reactor feed pumps (RFPs), feedwater regulating valves (FWRVs), high pressure feedwater heaters, piping, isolation valves, controls and instrumentation, and subsystems that supply the reactor with regenerative feedwater heating in a closed steam cycle. The portion of the system from the reactor pressure vessel to the outermost primary containment isolation valve is safety-related. During normal plant operation, feedwater is supplied to the system from the outlet of the condensate demineralizers. The feedwater passes through the RFP and out the discharge check valve into a common header upstream of the FWRVs. It then passes through FWRVs, which are mounted in parallel and then again combines into a common header upstream of the high pressure feedwater heaters. The feedwater is then directed through the high pressure feedwater heaters and the associated inlet and outlet isolation motor operated valves (MOVs) to a common header. Flow then passes through the A and B feedwater headers in parallel through two outboard isolation check valves, one inboard isolation check valve, and an inboard main isolation valve in each line. Feedwater flow is finally directed into the reactor vessel.

The feedwater system lines are also used to provide a flow path to the reactor vessel for the HPCI system and the RWCU system.

At Dresden, the HPCI system and RWCU system tap into the "B" feedwater line to inject fluid during emergency operations (HPCI) or as a return path for water removed from the vessel (RWCU).

At Quad Cities, the RCIC system and the RWCU system tap into the "A" feedwater line to either inject fluid during emergency operations or as a return path for water removed from the vessel (RWCU). Also the Quad Cities HPCI and safe shutdown makeup pump system tap into the B feedwater line to either inject fluid during emergency operations (HPCI) or as an injection path for the discharge of the safe shutdown makeup pump.

In LRA Section 2.3.4.2, the applicant described the feedwater system evaluation boundary. In addition, the applicant highlighted those portions of the feedwater system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.2. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the feedwater system in LRA Table 2.3.4-2 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- NSR vents or drains, piping, and valves (structural integrity/attached support)
- piping and fittings (spatial interaction)
- piping and fittings (structural integrity/attached support)
- small bore piping and fittings (pressure boundary, Quad Cities only)
- valves (pressure boundary)
- valves (structural integrity/attached support)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, and the licensee response to RAI 2.1-2b, the boundaries of non-safety-related sections of the feedwater system at Dresden and Quad Cities were expanded and highlighted as shown on the revised boundary diagrams. As a result of the scoping methodology change the entire feedwater system at both Dreseden and Quad Cities are included in the scope of license renewal.

The applicant identified the following additional component groups and their intended functions within the feedwater system as being within scope of license renewal, and added them to LRA table 2.3.4.2.

- Piping and Fittings (spatial interaction)
- Pumps (spatial interaction)
- Tubing (spatial interaction)
- Valves (spatial interaction)

2.3.4.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.2, Dresden UFSAR Section 10.4.7, and Quad Cities UFSAR Section 10.4.7 to determine whether there is a reasonable assurance that the feedwater system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the feedwater system in the LRA.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the feedwater system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the feedwater system. The staff then reviewed the referenced P&I drawings to verify that those portions of the feedwater system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.2, and that the applicant identified all feedwater system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.4.2-1. Section 2.3.4-2 of the LRA lists the intended functions for the feedwater system. The feedwater system interfaces with the primary containment and is safety-related for the portion of the system from the reactor vessel to the outermost primary containment isolation valve. Containment isolation is not listed as an intended function. The staff asked the applicant to provide justification for not including containment isolation as an intended function for the feedwater system.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.2-1, the applicant stated that the portion of the feedwater system from the RPV to the outermost safety-related check valve (primary containment isolation valve) has the intended function of containment isolation. The containment isolation intended function should have been included in LRA Section 2.3.4.2 for Dresden and Quad Cities. This does not affect the aging management of the in-scope components for the feedwater system. The components providing primary containment isolation also have an intended function of pressure boundary. Aging management for these affected components is discussed in LRA Section 2.3.4.2, Table 2.3.4-2.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.4.2-1 acceptable because the portion of the feedwater system from the RPV to the outermost safety-related check valve containment isolation is identified as having an intended function of containment isolation in accordance with the criteria set forth in 10 CFR 54.4 (a)(1). Therefore, the staff considers its concern described in RAI 2.3.4.2-1 resolved.

RAI 2.3.4.2-2. In Dresden Unit 3 drawing LR-DRE-M-347 (E-2), the 0.75 in. line just inside the outermost check valve shows to be in scope only through valve 3-3299-54; valve 3-3299-120 and the corresponding piping section after the valve is not shown to be in scope. In all other similar piping sections connected to safety-related piping, the section of piping immediately downstream of the safety-related piping is included in scope per 10 CFR 54.4 (a)(2). The staff asked the applicant to justify the exclusion of this section of piping from the scope for license renewal.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.2-2, the applicant stated that line 3-32142-3/4"-C on boundary diagram LR-DRE-M-347 (E-2) is a feedwater drain line that includes drain valve 3-3299-54 (inboard, safety-related) and 3-3299-120 (outboard, non-safety-related). Non-safety-related outboard drain valve 3-3299-120 and the associated piping beyond the safety boundary are in scope of license renewal for 10 CFR 54.4 (a)(2) criteria. Boundary diagram LR-DRE-M-347 should have highlighted these components to include the outboard drain valve 3-3299-120 and the associated piping beyond the safety boundary within the scope of license renewal.

Based on its review, the staff finds the applicant's response to RAI 2.3.4.2-2 to be acceptable because the applicant, in accordance with the criteria set forth in 10 CFR 54.4 identifies drain valve 3-3299-120 and its associated piping to be within the scope of license renewal, and they were inadvertently not highlighted in the LR boundary diagrams. Therefore, the staff considers its concern described in RAI 2.3.4.2-2 resolved.

2.3.4.2.3 Conclusions

The staff reviewed LRA Section 2.3.4.2, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the feedwater system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the feedwater system that are subject to an AMR, as required by 10 CFR 54.4(a)(1).

2.3.4.3 Condensate and Condensate Storage Systems

2.3.4.3.1 Summary of Technical Information in the Application

The applicant described the condensate and condensate storage systems in LRA Section 2.3.4.3 and provided a list of components subject to AMR in LRA Table 2.3.4-3.

The function of the condensate and condensate storage systems (in conjunction with the feedwater system) is to provide water of quality and quantity required for operation of the power plant. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following condensate and condensate storage systems intended functions:

- support ESF function(s)—provide reactor grade water to HPCI, RCIC (at Quad Cities), core spray, LPCI (at Dresden), and RHR (at Quad Cities)

- credited in regulated event(s)—provide water to support mitigating actions for Appendix R fire, SBO, and ATWS

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The condensate and condensate booster pump portion of the system supply reactor quality demineralized water to the suction of the reactor feedwater pumps. The condensate storage system's contaminated condensate storage tanks (CCSTs) ensure reactor quality water is available for makeup requirements, and are designed to ensure a minimum of 90,000 gallons of water is available from each CCST for use by HPCI. The CCSTs are credited for providing makeup to the reactor via the CRD pumps (at Dresden) or the RCIC and SSMP systems (at Quad Cities) for safe shutdown scenarios in the FP Plan. The condensate and systems pumping functions are not credited to support safe shutdown or to perform any reactor safety function.

In LRA Section 2.3.4.3, the applicant described the condensate and condensate storage system evaluation boundary. In addition, the applicant highlighted those portions of the systems within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.3. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the condensate and condensate storage system in LRA Table 2.3.4-3 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- piping and fittings (pressure boundary)
- piping and fittings (spatial interaction, Dresden only)
- piping and fittings (structural integrity/attached support, Quad Cities only)
- tanks (pressure boundary)
- thermowells (pressure boundary, Dresden only)
- tubing (pressure boundary)
- valves (pressure boundary)
- valves (structural integrity/attached support, Quad Cities only)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of non-safety-related sections of the condensate and condensate storage system at Dresden and Quad Cities were expanded and highlighted as shown on the revised boundary diagrams, and the newly added boundary diagrams. With the exception of the condensate demineralizers, steam jet air ejectors, and gland steam condensers, which reside in their own rooms isolated from safety-related equipment, the entire condensate and condensate storage systems at Dresden and Quad Cities were added to the scope of license renewal. This included condensate transfer pumps, condensate jocky pumps, and associated suction and discharge piping. The only component not included is the Dresden Unit 1 contaminated demineralized water storage tank which the applicant states was not included in the scope of license renewal because it is located outside the plant away from safety-related equipment.

The applicant identified the following additional component groups and their intended functions within the condensate and condensate storage system as being within scope of license renewal, and added them to LRA table 2.3.4.3.

- Piping and Fittings (includes strainers, flow elements, thermocouples and heat exchangers) (spatial interaction)
- Pumps (spatial interaction)
- Tanks (spatial interaction)
- Tubing (spatial interaction)
- Valves (spatial interaction)

Components that were added to scope only because of their leakage boundary (spatial) function were grouped such that those that are comprised of the same material and exposed to the same environment were grouped together. This grouping results in the inclusion of drain coolers (heat exchangers), feedwater heaters (heat exchangers), strainers, flow elements, and thermocouples in the component group for piping and fittings. This grouping is valid since for these components only the leakage boundary (spatial) function must be maintained and require aging management.

2.3.4.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.3, Dresden UFSAR Sections 9.2.6 and 10.4.7, and Quad Cities UFSAR Sections 9.2.6 and 10.4.7 to determine whether there is a reasonable assurance that the condensate and condensate storage system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the condensate and condensate storage system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

To verify that the applicant identified the components of the condensate and condensate storage system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the condensate and condensate storage system. The staff then reviewed the referenced P&I drawings to verify that those portions of the condensate and condensate storage system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.3, and that the applicant identified all condensate and condensate storage system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified one area in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued an RAI to the applicant concerning the specific item to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAI, and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.4.3-1. In Quad Cities drawing LR-QDC-M-16-5 (D-5), lines 0-33107A and 0-33108A, and valves 0-3399-227A and 0-3399-228A, are identified as not in scope for license renewal. These lines connect level switch LS 0-3341-71A, which is shown as in scope, to line 0-3348, which is also shown to be in scope. The staff asked the applicant to clarify whether these SSCs should be included in scope for license review.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.3-1, the applicant stated that isolation valves 0-3399-227A and 0-3399-228A for LS-0-3341-71A and the connecting piping 0-33107A-1" and 0-33108A-1" are in scope of license renewal. Boundary diagram LR-QDC-M-16-5 should have highlighted these components designating them within the scope of license renewal. Aging management for the valves is addressed in LRA Table 2.3.4-3, under the component group "valves," and component intended function of "pressure boundary." Aging management for the connecting piping is addressed in LRA Table 2.3.4-3, under component group "piping and fittings," and component intended function of "pressure boundary."

Based on its review of the applicant's clarification discussed above, the staff concurs with the applicant's clarification that the above-cited segments of piping and their associated components are within the scope of the Rule, and were inadvertently not highlighted in the LR boundary diagram. The staff also concurs with the applicant that the components associated with the cited segments of piping are included in LRA Table 2.3.4-3, subject to an AMR, in accordance with the criteria set forth in 10 CFR 54.21(a)(1). Therefore, the staff finds the applicant's response to RAI 2.3.4.3-1 acceptable and considers its concern described in RAI 2.3.4.3-1 resolved.

2.3.4.3.3 Conclusions

The staff reviewed LRA Section 2.3.4.3, the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the condensate and condensate storage system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the condensate and condensate storage system that are subject to an AMR, as required by 10 CFR 54.4(a)(1).

2.3.4.4 Main Condenser

2.3.4.4.1 Summary of Technical Information in the Application

The applicant described the main condenser in LRA Section 2.3.4.4 and provided a list of components subject to AMR in LRA Table 2.3.4-4.

The function of the main condenser is to—provide a heat sink for the turbine exhaust steam;

condense the bypass steam after a turbine trip; accommodate feedwater heater drains, extraction steam, and steam line condensate routed to the condenser during operation with feedwater heaters out of service; retain the condensate for a brief time to allow for the decay of short-lived isotopes; deaerate the condensate and remove fission product gases, hydrogen, and oxygen; provide adequate net positive suction head for condensate pumps; and provide for iodine plateout and radioactive decay prior to release.

Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following main condenser intended function:

- post accident containment, holdup and plateout of MSIV bypass leakage—the main condenser provides for post accident containment, holdup and plateout of MSIV bypass leakage

The main condenser is a divided water flow, single-pass, multipressure, deaerating type condenser, with capacity for reverse flow for each half of the condenser. The divided water flow permits circulating water to be reversed periodically through each bank of tubes in each half of the condenser for cleaning purposes. The condenser shell is supported on the turbine foundation mat. An expansion joint is fitted between each low-pressure turbine exhaust hood and condenser inlet connection. The condenser is divided into three separate compartments by two division plates.

The main condenser is credited in Dresden UFSAR Section 15.6 and Quad Cities UFSAR Section 15.6 for providing post accident containment, holdup and plateout of MSIV bypass leakage. The radiological consequences for the control room LOCA dose analysis assumes MSIV leakage travels down the steam piping to the turbine-condenser complex where it is released as a ground level release at a rate of 1 percent of the turbine condenser volume per day to the turbine building and then exhausted by the HVAC system if it was operating.

In LRA Section 2.3.4.4, the applicant described the main condenser evaluation boundary. In addition, the applicant highlighted those portions of the main condenser within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.4. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the main condenser system in LRA Table 2.3.4-4 as being within the scope of license renewal and subject to an AMR:

- main condenser hotwells and false floors, including hatches (containment holdup and plateout)
- main condenser tubes, including tubesheets and hatches (containment holdup and plateout)
- main condenser waterboxes and hatches (containment holdup and plateout)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1 the main condenser, which was originally included within the scope of license renewal at both Dresden and Quad Cities for post accident containment holdup and plateout, has also been brought into scope of license renewal for spatial interaction at Quad Cities station . The main condenser at Quad Cities is a non-safety-related component that resides in the same general area as the discharge piping from the emergency diesel cooling water system and thus the potential for spatial interaction could occur. The licensee states that this change only applies to Quad Cities as the same physical equipment configuration does not exist at Dresden.

The applicant has added the following system intended function to LRA section 2.3.4.4

Preclude adverse effects on safety-related SSCs - Non-safety-related components that could be hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

The applicant identified the following additional component groups and their intended functions for the Quad Cities Main Condenser as being within scope of license renewal, and added them to LRA table 2.3.4.4.

- Main Condenser Hotwells, False Floors (spatial interaction, Quad Cities only) (includes hatches)

- Main Condenser Waterboxes, hatches (spatial interaction, Quad Cities only)

2.3.4.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.4, Dresden UFSAR Sections 10.4 and 15.6.5.5.2, and Quad Cities UFSAR Sections 10.4 and 15.6.5.5.3 to determine whether there is a reasonable assurance that the main condenser system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the main condenser system in the LRA.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the main condenser system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the main condenser system. The staff then reviewed the referenced P&I drawings to verify that those portions of the main condenser system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.4, and that the applicant identified all main condenser system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified areas in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued RAIs to the applicant concerning the specific items to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAIs and the applicant's responses by letter, dated October 3, 2003, are described below.

RAI 2.3.4.4-1. In Section 2.3.4.4 of the LRA, it is indicated that an expansion joint is fitted between each low-pressure turbine exhaust hood and condenser inlet connection. These expansion joints are not included as a component group requiring AMR in Table 2.3.4-4. The staff asked the applicant to justify the exclusion of the expansion joints from the list of components requiring AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.4-1, the applicant stated that the condenser does not need a "pressure boundary" function. Holdup of radioiodines and noble gases that leak past the closed MSIVs is credited in the Dresden and Quad Cities LOCA and control rod drop accident (CRDA) analyses. Holdup is a function of the main condenser volume and leak rate. The Dresden and Quad Cities analyses assume the main condensers leak to the atmosphere at a rate of 1 percent per day throughout the accident. This value is a generic licensing basis assumption in SRP Section 15.4.9, "Radiological Consequences of Control Rod Drop Accident." This assumed leakage is larger than the actual leakage past the closed MSIVs into the main condenser. Therefore the condenser does not have to be leak tight.

The staff finds the applicant's response to RAI 2.3.4.4-1 acceptable since the limiting leak rate of the MSIV leakage from the condenser, used in the radiological analyses, did not credit the expansion joint between the turbine and the condenser inlet with providing a leak tight seal. Therefore, the staff considers its concern described in RAI 2.3.4.4-1 resolved.

RAI 2.3.4.4-2. In Table 2.3.4-4 the condenser shell is not included as a component group requiring AMR. The staff feels that this component is necessary to support the system intended function, and provides the component intended function of containment holdup and plateout, and thus should be included in Table 2.3.4-4. The staff asked the applicant to justify the exclusion of the condenser shell from the list of components requiring AMR.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.4-2, the applicant stated that the condenser shell is included in LRA Table 2.3.4-4, in the component group "main condenser hotwells, false floors (including hatches)."

The staff finds the applicant's clarification described above acceptable because the condenser shell is included in LRA Table 2.3.4-4, as subject to an AMR. Therefore, the staff considers its concern described in RAI 2.3.4.4-2 resolved.

2.3.4.4.3 Conclusions

The staff reviewed LRA Section 2.3.4.4 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the main condenser system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the main condenser system that are subject to an AMR, as required by 10 CFR 54.4(a)(1).

2.3.4.5 Main Turbine and Auxiliary Systems

2.3.4.5.1 Summary of Technical Information in the Application

The applicant described the main turbine and auxiliary systems in LRA Section 2.3.4.5 and provided a list of components subject to AMR in LRA Table 2.3.4-5.

The function of the main turbine is to convert the thermodynamic energy of reactor steam into rotational mechanical energy to drive the main generator. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following main turbine and auxiliary system intended function:

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The main turbine and auxiliary systems consist of one high-pressure section and three low-pressure sections. Turbine steam flow is controlled by a set of four turbine control valves on the high-pressure element main steam supply. Steam is delivered from the reactor pressure vessel through four main steam lines and the turbine throttle to the main stop valves, or to other loads of the main steam system. From the main stop valved, steam is passed through the steam chest (the area from below the seats of the main stop valves to the turbine control valve seats), through the turbine control valves, and then through the high-pressure turbine section. The steam is then routed to four moisture separators, where steam drying occurs. The dry steam is admitted through six combined intercept valves to the low-pressure turbine sections and exhausted to the main condenser.

The main turbine is supported by auxiliary systems. The gland sealing system provides gland-sealing steam to the high-pressure and low-pressure turbine glands to prevent steam from entering the turbine building and noncondensables from entering the condenser. The exhaust hood spray system provides cooling water to the condenser exhaust hood at low load, when steam flow through the last few turbine stages is low and insufficient cooling is provided. The turbine electrohydraulic control system provides high-pressure fluid and logic to control the turbine main stop valves, turbine control valves, combined intermediate valves, bypass valves, and the reactor pressure through pressure regulators.

The main turbine and auxiliary system starts with the steam chest (after the main stop valves) and ends at the condenser. Main turbine includes the steam chest, turbine control valves, turbine bypass valves, main turbine, moisture separator tanks, combined intermediate valves, low-pressure turbines, and associated piping, valves, instrumentation, and controls. Auxiliary systems include electrohydraulic control, off-gas booster air ejectors, turbine gland sealing, exhaust hood spray, gland seal exhaust, steam supply to steam jet air ejectors, and associated piping, valves, instrumentation, and controls.

In LRA Section 2.3.4.5, the applicant described the main turbine and auxiliary system evaluation boundary. In addition, the applicant highlighted those portions of the main turbine and auxiliary systems within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.5. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the main turbine and auxiliary system in LRA Table 2.3.4-5 as being within the scope of license renewal and subject to an AMR:

- accumulators (spatial interaction)
- closure bolting (pressure boundary)
- piping and fittings (spatial interaction)
- tubing, including flex hoses (spatial interaction)
- valves, including flex hoses (spatial interaction)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of non-safety-related sections of the main turbine and auxiliary system at Dresden and Quad Cities were expanded and highlighted as shown on the revised boundary diagrams and additional new boundary diagrams. Based on the revised methodology the entire main turbine and auxiliary system is within the scope of license renewal at both plants. The expanded scope adds portions of the electohydraulic control (EHC) system that had previously been excluded from scope based on the original methodology. Additional components such as ECH pumps, coolers, strainers, filters, accumulators and the EHC fluid reservoir are now brought into scope of license renewal.

The applicant identified the following additional component groups and their intended functions within the main turbine and auxiliary system as being within scope of license renewal, and added them to LRA table 2.3.4.5.

- Filters/Strainers (spatial interaction)(includes oil mist eliminators and vapor extractors)

- Pump Casing (spatial interaction)

- Tanks (spatial interaction)

The applicant states that EHC coolers, strainers, and filters were evaluated with the "Filter/Strainers" component group for aging management and that the EHC reservoirs were evaluated with an existing component group already included in Table 2.3.4-5 titled Accumulators. The EHC coolers (Heat Exchangers) were added to the scope of license renewal for spatial interaction only; therefore, only the leakage boundary (spatial) function must be maintained and require aging management. The EHC coolers were included in the Filter/Strainers component group because the leakage boundary of the EHC coolers (Heat Exchangers) is comprised of the same materials and experience the same environment as the components evaluated under the "Filter/Strainers (spatial interaction)" component group.

2.3.4.5.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.5, Dresden UFSAR Sections 7.7.4 and 10.2, and Quad Cities UFSAR Sections 7.7.4 and 10.2 to determine whether there is a reasonable assurance that the main turbine and auxiliary system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the main turbine and auxiliary system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSARs that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the main turbine and auxiliary system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the main turbine and auxiliary system. The staff then reviewed the referenced P&I drawings to verify that those portions of the main turbine and auxiliary system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.5, and that the applicant identified all main turbine and auxiliary system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the main turbine and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA 2.3.4.5. The main turbine and auxiliary systems components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.4-5. The staff did not identify any omissions.

2.3.4.5.3 Conclusions

The staff reviewed LRA Section 2.3.4.5 and accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the main turbine and auxiliary systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the main turbine and auxiliary systems that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4.6 Turbine Oil System

2.3.4.6.1 Summary of Technical Information in the Application

The applicant described the turbine oil system in LRA Section 2.3.4.6 and provided a list of components subject to AMR in LRA Table 2.3.4-6.

The function of the turbine oil system is to supply all the necessary lubricating oil to the main turbine and its support systems to allow the turbine to operate properly. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following turbine oil system intended function:

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The system is required to be in service during startups, normal operations, shutdowns, and at any time the turbine is on the turning gear. Depending upon the operating status of the turbine, the turbine oil system uses one of six oil pumps to transfer oil from the lube oil reservoir to the turbine generator components. The oil is cooled and filtered as necessary prior to delivery to the components.

Major system components include main turbine oil reservoir, oil driven turbine and booster pump, turbine oil coolers, vapor extractor, and the turbine oil filter and pumps. Also included are the turbine bearing oil lift pumps, emergency seal oil pump, main seal oil pump, recirculating seal oil pump, seal oil vacuum pump, hydrogen seal oil vacuum tank, and the bulk lubricating oil storage and transfer system. Additionally included are the system piping, valves, and instrumentation and controls to fill the turbine oil tank, and to supply oil from the turbine oil tank to the main turbine lubricating oil system, hydrogen seal oil system, reactor feed pumps, and HPCI turbine lubricating oil and recirculation MG set lubricating oil systems.

In LRA Section 2.3.4.6, the applicant described the turbine oil system evaluation boundary. In addition, the applicant highlighted those portions of the turbine oil system within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.6. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant initially identified the following component groups and their intended functions within the plant heating system in LRA Table 2.3.4-6 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- filters/strainers (spatial interaction)
- piping and fittings (spatial interaction)
- piping and fittings (structural integrity/attached support)
- pump casings (spatial interaction)
- tanks (spatial interaction)
- valves (spatial interaction)
- valves (structural integrity/attached support)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of non-safety-related sections of the turbine oil system at Quad Cities were expanded and highlighted as shown on the revised boundary diagrams and the newly added boundary diagrams. In addition, the turbine oil system, including the hydrogen seal oil subsystem was brought into scope of license renewal at Dresden station and new boundary drawing identifying the SSCs in scope of licensee renewal were provided by the licensee.

The applicant identified the following additional component groups for Dresden and their intended functions within the turbine oil system as being within scope of license renewal, and added them to LRA table 2.3.4.6.

- Closure Bolting (pressure boundary)

- Filters/Strainers (spatial interaction)

- Piping and Fittings (includes oil mist eliminator and vapor extractor) (spatial interaction)

- Pump Casings (spatial interaction)

- Tanks (spatial interaction)

- Valves (spatial interaction)

Aging management references for the components added to the scope of license renewal based on the revised methodology are already included in LRA Table 2.3.4-6, because the scope is no longer limited to Quad Cities, and now include both Dresden and Quad Cities, the additional components were added to the table by removing the Quad Cities only notation for the components identified in Table 2.3.4-6.

The lube oil mist eliminator and Vapor Extractor were added to the scope of license renewal for spatial interaction, typical component functions such as "Filtration" or "Pressure Boundary" do not require aging management and only the "Leakage boundary (spatial) function must be maintained and requires aging management. Since the leakage boundary of the lube oil mist eliminator and vapor extractor are comprised of the same material and experience the same environment as the components evaluated under the "Piping and Fitting (spatial interaction)" component group, they have been included as part of the "Piping and Fitting (spatial interaction)" component group in Table 2.3.4-6.

2.3.4.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.6 to determine whether there is a reasonable assurance that the turbine oil system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSARs to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the turbine oil system in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the turbine oil system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the turbine oil system. The staff then reviewed the referenced P&I drawings to verify that those portions of the turbine oil system that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.6, and that the applicant identified all turbine oil system components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff's review of the LRA identified one area in which additional information is necessary to complete the staff's review of the applicant's scoping and screening results. Therefore, by the August 4, 2003, letter, the staff issued an RAI to the applicant concerning the specific item to determine whether the applicant has properly applied the scoping and screening criteria of 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff's RAI and the applicant's responses by letter, dated October 3, 2003, are described below.

<u>RAI 2.3.4.6-1</u>. The portion of turbine oil system, line 2-2362-2 shown on drawing LR-QDC-M-48-1 (G1) and continued on LR-QDC-M-87-3 (D6), that goes to the Unit 2 HPCI oil junction box is not identified as being in scope. The corresponding line to the Unit 1 oil junction box is

shown as in scope. The staff asked the applicant to indicate whether this portion of the line should be included in scope and whether drawing LR-QDC-M-87 should be included as a reference in LRA Section 2.3.4.6.

Applicant's Response and Staff's Evaluation

In the response to RAI 2.3.4.6-1, the applicant stated that at the time that Exelon was completing the scoping and screening of the turbine oil system, a modification installation was in progress to remove both the Quad Cities Unit 1 and Unit 2 HPCI dirty oil transfer pumps and associated piping. As part of the modification, the 2 in. non-safety-related lines that penetrate the HPCI oil junction box were to be cut and capped. At the time that the scoping and screening was being performed, the HPCI turbine oil transfer line 2-2362-2" to the Unit 2 HPCI system was cut and capped prior to entering the HPCI oil junction box. Therefore, the small portion of non-safety-related turbine oil piping downstream of the cap was not included in scope of license renewal. The Unit 1 line had not yet been cut and capped, and was therefore included in scope. The present status is that the modification is complete and the lines on both units have been cut and capped.

Based on its review of the applicant's clarification discussed above, the staff finds the applicant's response to RAI 2.3.4.6-1 acceptable because a modification installation was performed to remove both the Quad Cities Unit 1 and Unit 2 HPCI dirty oil transfer pumps and associated piping. The subject lines on both units have been cut and capped. Therefore, the staff considers its concern described in RAI 2.3.4.6-1 resolved.

2.3.4.6.3 Conclusions

The staff reviewed LRA Section 2.3.4.6 , the accompanying scoping boundary drawings, and the applicant's response to RAIs, to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the turbine oil system that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the turbine oil system that are subject to an AMR, as required by 10 CFR 54.4(a)(1).

2.3.4.7 Main Generator and Auxiliary Systems

2.3.4.7.1 Summary of Technical Information in the Application

The applicant described the main generator and auxiliary systems in LRA Section 2.3.4.7 and provided a list of components subject to AMR in LRA Table 2.3.4-7.

The function of the main generator is to convert the mechanical energy of the turbine into electrical energy. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following main generator and auxiliary systems intended function:

- preclude adverse effects on safety-related SSCs—maintains sufficient integrity of non-safety-related components that could be a hazard to safety-related SSCs so that the intended function of safety-related SSCs is not adversely affected

The main generator and auxiliary systems consist of the main generator, main exciter, main generator stator coolers, and the isolated phase bus system. The stator water cooling system removes the heat produced by heating losses and removes the heat produced in the main generator field rectifiers. The isolated phase bus system cools the conductors, which connect the generator to the main transformer. The main generator exciter provides regulated excitation to the generator field windings to control generator output voltage and current. The main generator stator coolers provide clean, de-ionized cooling water to the stator and exciter during plant operation. The isolated phase bus electrically connects the main generator and the unit auxiliary transformer, and cools the main phase conductors.

In LRA Section 2.3.4.7, the applicant described the main generator and auxiliary systems evaluation boundary. In addition, the applicant highlighted those portions of the main generator and auxiliary systems within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.7. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the plant heating system in LRA Table 2.3.4-7 as being within the scope of license renewal and subject to an AMR:

- closure bolting (pressure boundary)
- heat exchangers (spatial interaction)
- housings heat exchangers (spatial interaction)
- piping and fittings (spatial interaction)
- pumps (spatial interaction)
- tanks (spatial interaction)
- valves (spatial interaction)

Resulting from the revised methodology described in the May 18, 2004 response to the draft SER Open Item 2.1-1, the boundaries of non-safety-related sections of the main generator and auxiliaries were expanded and highlighted as shown on the revised boundary diagrams and the additional new boundary diagrams. The original scoping results described in section 2.3.4.7 of the LRA only included a portion of the main generator and auxiliaries (Stator Cooling) at Quad Cities. Portions of the stator cooling system were excluded under the old methodology has been brought into scope of license renewal based on application of the revised methodology. As a result of the change in methodology the entire main generator and auxiliaries system was brought into scope of license renewal at Dresden station and new boundary drawing identifying the SSCs in scope of licensee renewal were provided by the licensee. The change in methodology has resulted in the addition of the entire main generator and auxiliaries system within the scope of license renewal at both sites.

The applicant identified the following additional component groups for Dresden and their intended functions within the turbine oil system as being within scope of license renewal, and added them to LRA table 2.3.4.7.

- Heat Exchangers (spatial interaction)
- Housings (spatial interaction)
- Piping and Fittings (includes filters and demineralizers) (spatial interaction)
- Pump (spatial interaction)
- Tanks (spatial interaction)
- Valves (spatial interaction)

Aging management references for the components added to the scope of license renewal bases on the revised methodology are already included in LRA Table 2.3.4-7, because the scope is no longer limited to Quad Cities, and now include both Dresden and Quad Cities, the additional components were added to the table by removing the Quad Cities only notation for the components identified in Table 2.3.4-7.

The filters, generator filters, and stator water demineralizes highlighted on the boundary diagrams were added to the scope of license renewal for spatial interaction. Typical component functions such as "Filtration" or "Pressure Boundary" do not require aging management and only the "Leakage boundary (spatial) function must be maintained and requires aging management. Since the leakage boundary of the these components are comprised of the same material and experience the same environment as the components evaluated under the "Piping and Fitting (spatial interaction)" component group they have been included as part of the "Piping and Fitting (spatial interaction)" component group in Table 2.3.4-7.

2.3.4.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.7 and Quad Cities UFSAR Section 8.3 to determine whether there is a reasonable assurance that the main generator and auxiliary systems components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the main generator and auxiliary systems in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the main generator and auxiliary systems that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the main generator and auxiliary systems. The staff then reviewed the referenced P&I drawings to verify that those portions of the main generator and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.7, and that the applicant identified all main generator and auxiliary systems components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the main generator and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.7. The main generator and auxiliary systems components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.4-7. The staff did not identify any omissions.

2.3.4.7.3 Conclusions

The staff reviewed LRA Section 2.3.4.7 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the main generator and auxiliary systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the main generator and auxiliary systems that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4.8 *Extraction Steam System* (Quad Cities Only)

As a result of the revised scoping methodology, the extraction steam was added to the scope of license renewal at Quad Cities. Specifically, the entire extraction steam piping system was added to the scope of license renewal because the system could spatially interact with safety-related pipe located in the feedwater heater area.

2.3.4.8.1 Summary of Technical Information in the Application

The applicant described the extraction steam system in LRA Section 2.3.4.8 and provided a list of components subject to AMR in LRA Table 2.3.4-8. This LRA section was not included in the original LRA but was added to the scope of license renewal at Quad Cities as a result of the revised scoping methodology and was provided to the staff in the applicants response to the draft SER Open Item 2.1-1.

The function of the extraction steam system is to preheat feedwater as it passes through the feedwater heaters prior to being returned to the reactor vessel. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following extraction steam system intended function:

- preclude adverse effects on safety-related SSCs— Non-safety-related components that could be a hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

The extraction steam system extracts steam from various points on the main turbine and routes it along with water from the moister separator drains to the feedwater heaters. The steam is then added to heat the condensate and feedwater which flows through the tube side of the feedwater heaters and flash tanks. Extraction steam provides the major heat source during normal operation of the feedwater heaters.

The extraction steam system boundary includes piping and valves that supply extraction steam from the low pressure turbine exhaust piping interface to the A, B, and C feedwater heaters and flash tanks. This includes pipe, valves, and associated instrumentation.

In LRA Section 2.3.4.8, the applicant described the extraction steam system evaluation boundary. In addition, the applicant highlighted those portions of the main generator and auxiliary systems within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.8. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the plant heating system in LRA Table 2.3.4-8 as being within the scope of license renewal and subject to an AMR:

- Piping and Fittings (spatial interaction, Quad Cities only)

- Valves (spatial interaction, Quad Cities only))

The LP heaters and Heater Flash Tanks that are highlighted on the boundary drawings for this system are in scope of license renewal and require aging management are evaluated as part of the Condensate and Condensate Storage System which is discussed in LRA Section 2.3.4.3.

2.3.4.8.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.8 and Quad Cities UFSAR Sections 10.1 and 10.4 to determine whether there is a reasonable assurance that the extraction steam system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the main generator and auxiliary systems in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the main generator and auxiliary systems that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the main generator and auxiliary systems. The staff then reviewed the referenced P&I drawings to verify that those portions of the main generator and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.8, and that the applicant identified all main generator and auxiliary systems components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the main generator and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.8. The main generator and auxiliary systems components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.4-8. The staff did not identify any omissions.

2.3.4.8.3 Conclusions

The staff reviewed LRA Section 2.3.4.8 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the main generator and auxiliary systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the extraction steam system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4.9 *Feedwater Heater Drains and Vents System*

2.3.4.9.1 Summary of Technical Information in the Application

The applicant described the feedwater heater drains and vents steam system in LRA Section 2.3.4.9 and provided a list of components subject to AMR in LRA Table 2.3.4-9. This LRA section was not included in the original LRA but was added to the scope of license renewal at Quad Cities as a result of the revised scoping methodology and was provided to the staff in the applicants response to the draft SER Open Item 2.1-1.

The function of the feedwater heater drains is to establish and maintain the desired level of condensate in the feedwater heater shells. The function of the feedwater heater vent system is to remove non-condensible gases from the heater shells and tubes during start-up and power generation. Using the methodology described in LRA Section 2.1.4.1 for identifying the mechanical components within the scope of license renewal, the applicant identified the following extraction steam system intended function:

- preclude adverse effects on safety-related SSCs—Non-safety-related components that could be a hazard to safety-related SSCs maintain sufficient integrity so that the intended function of safety-related SSCs is not adversely affected.

The feedwater heater system is divided into three parallel strings. Each string contains three low pressure heaters A, B, and C and one high pressure heater D. Condensate cascades from the D high pressure heater to the A, B, and C low ressure heaters in each string. The condensate exits the A low pressure feedwater heater and is routed through a heater flash tank and low pressure feedwater heater drain coolers in each string. Drainage is ultimately routed to the main condenser.

The feedwater heater drain and vent system is comprised of the piping and components that connect each of the flash tanks, heaters, and coolers. The feedwater heater coolers, and tanks were are evaluated in the feedwater system and in the condensate and condensate makeup system.

In LRA Section 2.3.4.9, the applicant described the feedwater heater drains and vents system evaluation boundary. In addition, the applicant highlighted those portions of the feedwater heater vents and drains systems within the scope of the Rule in the P&I drawings listed as references in LRA Section 2.3.4.9. Also, based on the methodology described in LRA Section 2.1.5 for identifying the mechanical components subject to an AMR, the applicant identified the following component groups and their intended functions within the plant heating system in LRA Table 2.3.4-9 as being within the scope of license renewal and subject to an AMR:

- Piping and Fittings (spatial interaction, Quad Cities only)

- Valves (spatial interaction, Quad Cities only)

The LP heaters and Heater Flash Tanks, and Condensing Chambers that are highlighted on the boundary drawings for this system are in scope of license renewal and require aging management . These components were evaluated as part of the Condensate and Condensate Storage System which is discussed in LRA Section 2.3.4.3.

2.3.4.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.9 and Quad Cities UFSAR Section 10.4.7.2 to determine whether there is a reasonable assurance that the extraction steam system components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 10 CFR54.21(a)(1). The staff's review was conducted in accordance with Section 2.3 of NUREG-1800.

In the performance of the review, the staff reviewed the UFSAR to determine if there were any system functions that were not identified in accordance with the requirements of 10 CFR 54.4 as an intended function of the main generator and auxiliary systems in the LRA. The staff did not identify any omissions.

Also, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any component were omitted.

To verify that the applicant identified the components of the main generator and auxiliary systems that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively, the staff compared the referenced P&I drawings to the system drawings and system descriptions in the UFSARs to ensure that the referenced P&I drawings were representative of the main generator and auxiliary systems. The staff then reviewed the referenced P&I drawings to verify that those portions of the main generator and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.9, and that the applicant identified all main generator and auxiliary systems components within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The staff found that those portions of the main generator and auxiliary systems that meet the scoping requirements of 10 CFR 54.4 are included within the scope of license renewal and are identified as such by the applicant in LRA Section 2.3.4.9. The main generator and auxiliary systems components that are subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1) are included in LRA Table 2.3.4-9. The staff did not identify any omissions.

2.3.4.9.3 Conclusions

The staff reviewed LRA Section 2.3.4.9 and the accompanying scoping boundary drawings to determine whether any SSCs within the scope of license renewal had not been identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. No omissions were found. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the main generator and auxiliary systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the components of the extraction steam system that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4 Scoping and Screening Results: Structures

This section addresses the structure-related scoping and screening results for license renewal. The structures identified in LRA Table 2.2-2 as being in the scope of license renewal are as follows:

- Primary Containment (LRA 2.4.1)
- Reactor Building (LRA 2.4.2)
- Main Control Room and Auxiliary Electric Equipment Room (LRA 2.4.3)
- Turbine Building (LRA 2.4.4)
- Diesel Generator Buildings (LRA 2.4.5)
- Station Blackout Building and Yard Structures (LRA 2.4.6)
- Isolation Condenser Pump House (Dresden Only) (LRA 2.4.7)
- Makeup Demineralizer Building (Dresden Only) (LRA 2.4.8)
- Radwaste Floor Drain Surge Tank (LRA 2.4.9)
- Miscellaneous Foundations (LRA 2.4.10)
- Crib House (LRA 2.4.11)
- Unit 1 Crib House (Dresden Only) (LRA 2.4.12)
- Station Chimney (LRA 2.4.13)
- Cranes and Hoists (LRA 2.4.14)

In addition, the applicant has identified the following commodity groups as within the structures scope:

- Component Supports Commodity Group (LRA 2.4.15)
- Insulation Commodity Group (LRA 2.4.16)

Section 54.21(a)(1) of Title 10 of the *Code of Federal Regulations* requires an applicant to identify and list structures and components subject to an AMR. These are passive, long-lived structures and components that are within the scope of license renewal. To verify that the applicant has properly implemented its methodology, the staff focuses its review on the implementation results. Such a focus allows the staff to confirm that there is no omission of structural components that are subject to an AMR. If the review identifies no omission, the staff has the basis to find that the applicant has identified the structural components that are subject to an AMR.

LRA Table 2.2-2 also identifies the following structures that are not in scope of license renewal.

- fuel oil pump house and oil storage tank foundation (Dresden)
- meteorological tower
- miscellaneous administrative buildings
- miscellaneous yard structures
- miscellaneous radwaste buildings

- miscellaneous river water structures
- miscellaneous Dresden Unit 1 structures (Dresden)
- miscellaneous transmission and distribution structures

Except for the meteorological tower and miscellaneous administrative buildings (provided there are no seismic II/I intended functions associated with these structures), the staff was unable to evaluate whether these structures are correctly excluded from the license renewal scope.

As a result, the staff requested the applicant to provide additional descriptive information for the remaining six structures before a determination can be made on their inclusion in the scope. The staff asked the applicant the following in RAI 2.4-1:

- Submit a more detailed description of these six structures, define their function, and describe the technical bases for exclusion from the license renewal scope.

- Verify that none of the eight structures serve a seismic II/I intended function.

In its response to this RAI, the applicant stated the following:

> The eight (8) structures listed in RAI 2.4-1 are groups of non-safety-related structures and major components that do not satisfy the requirements of 10 CFR 54.4(a). These structures provide structural support and anchorage for non-safety-related equipment and equipment that is not required to support regulated events (ATWS, FP, EQ, and SBO). None of structures and major components in these structural groups serves a seismic II/I intended function. This was the technical basis for exclusion from the license renewal scope. With the exception of the meteorological towers, a description of remaining structural groups along with their functions is provided below.
>
> Dresden—Fuel Oil Pump House and Oil Storage Tank Foundation
> This structural group contains structures that support the non-safety-related plant fuel supply subsystem for the plant heating steam boilers.
>
> Dresden and Quad Cities Stations—Miscellaneous Administrative Buildings
> This structural group covers a number of administrative, warehouse, and miscellaneous structures. Several of the structures provide protection for non-safety-related equipment from the outside environment.
>
> Dresden and Quad Cities Stations—Miscellaneous Yard and Tank Structures
> This structural group is a collection of miscellaneous non-safety-related structures located throughout the site. Several of the structures provide protection for equipment from the outside environment and also provide a barrier to contain potentially environmentally hazardous materials.
>
> Dresden and Quad Cities Stations—Miscellaneous Radwaste Buildings
> This structural group is a collection of miscellaneous non-safety-related structures that provide structural support and anchorage of non-safety-related equipment and systems and treated/processed radwaste materials. Several of these structures provide protection of personnel and non-safety-related facilities, equipment and components from the outside environment and also provide radiation shielding.
>
> Dresden Station—Miscellaneous River Water Structures

This structural group is a collection of miscellaneous non-safety-related structures related to the circulating water systems, cooling water canals, and reservoirs. These structures provide protection of personnel and non-safety-related equipment from the outside environment and provide structural support for non-safety-related equipment. A description of those structures and components included within this structural group along with their functions are provided below.

Units 2 & 3 Circ Water Discharge Pipes—The circulating water discharge pipes provide the means of discharge/dispersion of heated circulating water into the Dresden cooling lake and/or the Illinois River. The circulating water discharge also provides the means of discharge, dispersion and dilution of low level liquid radwaste.

2/3 Circ Water Flow Regulating Station—A structure with gates that distributes the water returning from the lake to the river (indirect open-cycle operation), to the intake flume to the crib house (closed cycle operation), or to a combination of both.

Unit 2 & 3 Lake Lift Station—The lift station provides protection for all non-safety-related systems and components contained within the structure from the outside environment. The lift station provides structural support for station cooling water system equipment. This equipment functions in controlling the flow of cooling water from the cooling lake through the intake and discharge canals. Additionally, the Lift Station maintains the hot canal and lake levels.

Circulating Water Cooling Towers (3)—The circulating water cooling towers provide supplemental cooling of the circulating water.

Goose Lake Pumping Station—The Goose Lake Pumping Station provides protection of pumps that control level in the adjacent retention pond.

Units 2 & 3 Cooling Lake, dikes and canals—The cooling lake provides cooling of the circulating water and service water prior to discharge into the Illinois River or return to the plant.

Quad Cities Station—Miscellaneous River Water Structures

This structural group is a collection of miscellaneous non-safety-related structures related to the circulating river water system. The circulating water system takes suction directly from the Mississippi River, discharges the flow through the condenser, and directs it back to the river. A description of those structures and components included within this structural group along with their functions are provided below.

Discharge Flume—The discharge flume controls direction of flow.

Discharge Flume Sample Pump (Structure)—The discharge flume sample pump structure houses and protects the non-safety-related sample pump.

Dock—The dock provides access to river.

Floating Boom—The primary function of the floating boom is to prevent floating river debris from entering the intake flume and/or the circulating water pumps.

Intake Flume—The intake flume directs water to Crib House.

Lift Station— Lift Station structure provides protection for the non-safety-related pumps and associated components that support the circulating water system from the outside environment. This facility is no longer in use.

Spray Canal—The spray canal was previously used to convey heated circulation water discharge for cooling. It is currently used in conjunction with the Fish Study Facility Building to produce walleye and hybrid striped bass fingerlings for stocking and release to the Mississippi River.

Spray Canal Blowdown Diffuser Pipe—The spray canal blowdown diffuser pipe provides measures for dispersion of circulating water. The spray canal blowdown south diffuser pipe and the discharge bay function as the three site release points for liquid effluents.

Spray Canal Diversion Wall—The spray canal diversion wall provides flow direction control.

Wing Dam (6)—Wing dams provide river flow control. Wing Dam 31 is located between the intake and discharge canals and functions as a recirculation barrier that helps preclude released radioactive materials from being introduced back into the circulating water system. The top of this wing dam is about 2 feet below the river surface which creates some downstream water flow to prevent stagnant water areas from forming.

Dresden Station—Miscellaneous Dresden Unit 1 Structures

This structural group is a collection of miscellaneous non-safety-related structures associated with Unit 1 at Dresden Station. Dresden Unit 1 shares the site and surrounding area with Units 2 and 3. Unit 1 has been placed in a safe storage condition until Units 2 and 3 are ready for decommissioning. None of these structures provide functional support for Units 2 and 3 and none of structures and major components in this structural group serves a seismic II/I intended function that could affect Units 2 and 3.

Dresden Station—Miscellaneous Transmission and Distribution Structures

This structural group is a collection of miscellaneous non-safety-related structures associated with the 138 KV and 345 KV switchyards. The purpose of the structures included in this group is to provide support and protection of the non-safety-related components that are used for transmitting electrical power generated by the plant. Those transmission towers necessary to provide offsite power restoration as defined by 10 CFR 50.63 (SBO) are included in the scope of license renewal and evaluated with the Station Blackout Building structure (See section 2.4.6 of the LRA). Those switchyard foundations providing necessary support for equipment and structures (e.g., breaker, end structures, and disconnect foundations) necessary to provide offsite power restoration as defined by 10 CFR 50.63 (SBO) are included in the scope of license renewal and evaluated with the Station Blackout Building structure (See section 2.4.6 of the LRA).

Quad Cities Station—Miscellaneous Transmission and Distribution Structures

This structural group is a collection of miscellaneous non-safety-related structures associated with the 345 KV switchyard. The purpose of the structures included in this group is to provide support and protection of the non-safety-related components that are used for transmitting electrical power generated by the plant. Those transmission towers necessary to provide offsite power restoration as defined by 10 CFR 50.63 (SBO) are included in the scope of license renewal and evaluated with the Station Blackout Building structure (See section 2.4.6 of the LRA).

For each group listed above, the applicant also identified the specific structures and major components within the group and the function of each structure or major component. The applicant's response to RAI 2.4-1 is complete. Based on its review of the information in the RAI response, the staff concludes that the applicant conducted a comprehensive study to identify the structures and components that are within the scope of license renewal. RAI 2.4-1 is, therefore, resolved.

2.4.1 Primary Containment

2.4.1.1 Summary of Technical Information in the Application

The applicant described the primary containment in LRA Section 2.4.1 and provided a list of components subject to an AMR in LRA Table 2.4-1.

The primary containment provides a barrier that controls the release of fission products to the secondary containment in the event of a loss-of-coolant accident (LOCA). It also provides structures and a water pool that limit the pressure increase in the containment in the event of a LOCA.

The primary containment is a General Electric Mark I design. It consists of a drywell, a pressure suppression chamber that is partially filled with water, and a vent system connecting the drywell and the suppression chamber. The design, fabrication, and inspection of the primary containment was in accordance with the requirements of the ASME Pressure Vessel Code, Section III, Class B. It is a Class I structure.

The drywell is a steel pressure vessel with a spherical lower section and a cylindrical upper section. A portion of the lower spherical section is embedded in concrete. This embedment, in combination with upper lateral supports that are attached to the cylindrical section, forms the reactor support system. The drywell houses the reactor vessel, the reactor coolant recirculation system, and branch connections of the reactor primary system. It includes structural steel framing, a concrete radiation shield wall between the reactor pressure vessel and the drywell walls, a removable steel head, an equipment hatch and other access hatches, a personnel airlock with two mechanically interlocked doors, and penetrations.

The drywell head is removed during refueling operations. The head is held in place by bolts and is sealed with a double gasket, tongue-and-groove arrangement that permits checks for leak tightness without pressurizing the entire containment.

The pressure suppression chamber is a toroidal-shaped, steel pressure vessel encircling the base of the drywell. The suppression chamber is commonly called the torus and includes internal steel framing, supports, access hatches, and penetrations. The suppression chamber is mounted on support structures that transmit loads to the concrete foundation of the reactor building.

Eight circular vent lines form a connection between the drywell and the pressure suppression chamber. These drywell vent lines are connected to a header which is contained within the air space of the suppression chamber. The header downcomers terminate below the suppression chamber water level. The primary containment also contains structural interfacing components of the electrical penetrations.

The applicant identified the following UFSAR references for additional descriptive information about the primary containment:

- Dresden Station UFSAR Section(s): 6.2.1, 3.2.1
- Quad Cities Station UFSAR Section(s): 6.2.1, 3.2.1

The applicant defined the following intended functions for the primary containment:

- Primary containment—controls the release of fission products to the secondary containment in the event of design-basis LOCAs so that offsite consequences are within acceptable limits.

- Physical support and protection—provides physical support and protection for safety-related components and components relied upon to demonstrate compliance with fire protection, ATWS, and SBO-regulated events. The structure also contains components that are relied upon for compliance with 10 CFR 50.49, (EQ).

- Pressure suppression—provides sufficient air and water volumes to absorb the energy released to the containment in the event of design-basis events so that the pressure is within acceptable limits.

- Water source—provides a source of water for emergency core cooling systems.

- Radiation shielding—biological shield wall between the reactor pressure vessel and the drywell walls provides protection to personnel and components from radiation.

In LRA Table 2.4-1, the applicant listed the following component groups as requiring AMR for the primary containment:

Component	Component Intended Function	LRA Aging Management Ref No.
Beam Seats	Structural Support	3.5.1.20
Concrete and Grout	Structural Support	3.5.1.29
Concrete Slabs	Structural Support	3.5.1.20, 3.5.1.27
Concrete Walls	Structural Support	3.5.1.20, 3.5.1.27
Concrete Walls	Shelter, Protection, Shielding	3.5.1.20, 3.5.1.27
Containment Penetrations (Electrical)	Structural Support	3.5.1.3
Containment Penetrations (Electrical)	Fission Product Barrier	3.5.1.3
Containment Penetrations (Electrical)	Structural Pressure Barrier	3.5.1.3

Component	Component Intended Function	LRA Aging Management Ref No.
Containment Penetrations (Mechanical)	Structural Support	3.5.1.3
Containment Penetrations (Mechanical)	Fission Product Barrier	3.5.1.3
Containment Penetrations (Mechanical)	Structural Pressure Barrier	3.5.1.3
Containment Penetrations Bellows	Fission Product Barrier	3.5.1.2
Containment Penetrations Bellows	Structural Pressure Barrier	3.5.1.2
Downcomers	Structural Pressure Barrier	3.5.1.12, 3.5.1.14
Drywell Expansion Foam	Expansion/Separation	3.5.2.8
Drywell Heads	Structural Support	3.5.1.12, 3.5.1.14
Drywell Heads	Fission Product Barrier	3.5.1.12, 3.5.1.14
Drywell Heads	Structural Pressure Barrier	3.5.1.12, 3.5.1.14
Drywells	Structural Support	3.5.1.12, 3.5.1.14
Drywells	Fission Product Barrier	3.5.1.12, 3.5.1.14
Drywells	Structural Pressure Barrier	3.5.1.12, 3.5.1.14
Hatches	Structural Pressure Barrier	3.5.1.4, 3.5.1.5
Misc. Steel (includes Stairs, Ladders, Platforms, Gratings)	Non-S/R Structural Support	3.5.1.20
Penetration Sleeves, Penetration Bellows	Structural Support	3.5.1.1
Penetration Sleeves, Penetration Bellows	Fission Product Barrier	3.5.1.1
Penetration Sleeves, Penetration Bellows	Structural Pressure Barrier	3.5.1.1
Seals	Structural Pressure Barrier	3.5.1.6
Steel Embedments	Structural Support	3.5.1.20
Steel Panels and Cabinets	Structural Support	3.5.1.20
Structural Steel	Structural Support	3.5.1.20
Suppression Chambers	Structural Support	3.5.1.12, 3.5.1.13, 3.5.1.14
Suppression Chambers	Fission Product Barrier	3.5.1.12, 3.5.1.13, 3.5.1.14
Suppression Chambers	Structural Pressure Barrier	3.5.1.12, 3.5.1.13, 3.5.1.14
Thermowells	Structural Support	3.5.2.15
Thermowells	Structural Pressure Barrier	3.5.2.15
Vent Headers	Structural Support	3.5.1.13
Vent Headers	Structural Pressure Barrier	3.5.1.12, 3.5.1.13, 3.5.1.14

Component	Component Intended Function	LRA Aging Management Ref No.
Vent Line Bellows	Structural Support	3.5.1.13
Vent Line Bellows	Structural Pressure Barrier	3.5.1.13, 3.5.1.17
Vent Lines	Structural Support	3.5.1.12, 3.5.1.14
Vent Lines	Structural Pressure Barrier	3.5.1.12, 3.5.1.14
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the primary containment are provided in LRA Sections 3.3 and 3.5.

2.4.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.1, Dresden Station UFSAR Sections 6.2.1 and 3.2.1, and Quad Cities Station UFSAR Sections 6.2.1 and 3.2.1 to determine whether the primary containment structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Section 2.4.1 discusses the scoping and screening results for the primary containment. It is the staff's understanding that this section of the LRA addresses not only the primary containment (drywell, pressure suppression chamber, and the vent system connecting the two structures), but also all the structures inside the containment, all attachments to the containment, and the containment supports. LRA Table 2.4-1 identifies the primary containment component groups requiring AMR, the associated component intended function(s), and the AMR reference. Since LRA Table 2.4-1 combines many components under a single component group, the staff requested (RAI 2.4-2) that the applicant identify which component group is intended to cover the specific components listed in (a) through (k) below, or identify the location in the LRA where these specific components are addressed. If these specific components are not considered to be within the scope of license renewal, the applicant was requested to provide the technical bases for their exclusion. To assist in the review, the staff has noted figure numbers from either the Dresden or the Quad Cities UFSAR that identify specific components. However, the component list applies to all four units.

(a) reactor vessel to biological shield stabilizers (D—UFSAR Figures 3.9-1 and 3.9-2)

(b) biological shield to containment stabilizer (D—UFSAR Figures 3.9-1 and 3.9-2 and QC—UFSAR Figures 3.9-5 and 3.9-8)

(c) RPV male stabilizer attached to outside of drywell shell (QC—UFSAR Figures 3.9-5 and

3.9-8)

(d) RPV female stabilizer and anchor rods (also referred to as gib) embedded in reactor building concrete wall (D—UFSAR Figure 3.9-1 and QC—UFSAR Figures 3.9-8 and 3.9-9)

(e) biological shield wall and anchor bolts (D—UFSAR Figures 3.9-2 and 3.9-7 and QC—UFSAR Figures 3.9-5 and 3.9-6)

(f) reactor vessel support skirt and anchor bolts (D—UFSAR Figures 3.9-2 and 3.9-3 and QC—UFSAR Figures 3.9-5, 3.9-6, and 3.9-10)

(g) reactor vessel support ring girder and anchor bolts (D—UFSAR Figures 3.9-2 and 3.9-3 and QC—UFSAR Figures 3.9-5, 3.9-6, and 3.9-10)

(h) reactor vessel support pedestal (D—UFSAR Figures 3.9-2 and 3.9-3 and QC—UFSAR Figures 3.9-5 and 3.9-6)

(i) drywell internal 6x1-in. steel shear ring (QC—UFSAR Figures 3.9-5 and 3.9-7)

(j) drywell steel support skirt and anchor bolts (QC—UFSAR Figures 3.9-5 and 3.9-7)

(k) drywell head closure bolts and double gasket, tongue-and-groove seal arrangement (described in LRA Section 2.4.1)

In a letter dated December 5, 2003, in response to RAI 2.4-2, the applicant stated the following:

> All of the components described below are included within the scope of license renewal. Items (a) through (k) below provide the LRA Table number and Component Group that address each specific component.
>
> (a) Reactor Vessel to Biological Shield Stabilizers—Table 2.4-1, Primary Containment, Component Group—Structural Steel
>
> (b) Biological Shield to Containment Stabilizer—Table 2.4-1, Primary Containment, Component Group—Structural Steel
>
> (c) RPV Male Stabilizer Attached to Outside of Drywell Shell—Table 2.4-1, Primary Containment, Component Group—Steel Embedments
>
> (d) RPV Female Stabilizer and Anchor Rods (also referred to as Gib) embedded in Reactor Building concrete wall—Table 2.4-1, Primary Containment, Component Group—Steel Embedments
>
> (e) Biological Shield Wall—Table 2.4-1, Primary Containment, Component Group—Concrete Walls (Structural Support and Shelter, Protection, Shielding)
>
> (f) Anchor bolts—Table 2.4-15, Component Supports, Component Group—Anchorage to

Buildings, Including Bolted/Welded Connections (Structural Support)

(g) Reactor Vessel Support Skirt—Table 2.3.1-1, Reactor Vessel, Component Group—Support Skirts and Attachment Welds

Anchor bolts—Table 2.4-15, Component Supports, Component Group—Anchorage to Buildings, Including Bolted/Welded Connections (Structural Support)

(h) Reactor Vessel Support Ring Girder—Table 2.4-1, Primary Containment, Component Group—Support Members

Anchor bolts—Table 2.4-15, Component Supports, Component Group—Anchorage to Buildings, Including Bolted/Welded Connections (Structural Support)

(i) Reactor Vessel Support Pedestal—Table 2.4-1, Primary Containment, Component Group—Concrete Walls (Structural Support)

(j) Drywell internal 6x1-inch steel shear ring—Table 2.4-1, Primary Containment, Component Group—Steel Embedments

(k) Drywell steel support skirt—Table 2.4-1, Primary Containment, Component Group—Support Members

Anchor bolts—Table 2.4-15, Component Supports, Component Group—Anchorage to Buildings, Including Bolted/Welded Connections (Structural Support)

(l) The drywell head closure bolts—Table 2.4-1, Primary Containment, Component Group—Drywell Heads

Double Gasket—Exelon procedure requires the gasket material to be replaced during reactor reassembly (at least once per refuel cycle). These gaskets are not long lived and therefore do not require aging management.

Tongue-and-groove Seal Arrangement—Table 2.4-1, Primary Containment, Component Groups—Drywell Heads and Drywells

In its response, the applicant identified a specific component group for all items listed in the RAI, except for the double gasket. Since the double gasket is on a regular replacement schedule, the staff concurs that it does not require aging management for license renewal. The staff finds the applicant's response acceptable and, therefore, RAI 2.4-2 is resolved.

Leakage through the refueling seals located at the top of the drywell potentially exposes the carbon steel drywell shell inner and outer surfaces to loss of material due to corrosion. This is a particular concern for the embedded portion of the drywell shell. Corrosion detected on the outer shell surface in the sand pocket region in a number of Mark I steel containments has been attributed to leakage past the drywell-to-reactor building refueling seal, coupled with clogging of the sand pocket drains. Leakage into the drywell, past the reactor vessel-to-drywell refueling seal, creates the potential for corrosion of the inaccessible portion of the inner surface of the drywell shell embedded in the concrete floor.

From the information contained in the LRA, it was not clear to the staff (1) whether the refueling seals have been included in the license renewal scope, and (2) if included, how aging management is being addressed. Therefore, the applicant was requested (RAI 2.4-3) to submit the following information:

(a) verification that the refueling seals are included in the license renewal scope, or a detailed explanation for their exclusion

(b) a detailed description of the plant-specific operating experience for the refueling seals in all four units, including incidences of degradation, method of detection, root cause, corrective actions, and current inspection procedures

(c) a detailed description of the scoping, screening, and aging management review for the refueling seals

(d) the aging management program(s) credited to manage aging of the refueling seals

In a letter dated December 12, 2003, in response to RAI 2.4-3, the applicant stated the following:

> (a) The refueling seals are not within the scope of license renewal. Title 10, CFR 54, Section 54.4(a), sets forth the criteria that determine whether plant systems, structures, and components are within the scope of license renewal. The refueling seals do not satisfy any of the requirements set forth in 10 CFR 54.4(a).
>
> The refueling seals are not safety-related and they are not relied upon to remain functional during design basis events to ensure (I) the integrity of the reactor coolant pressure boundary, (ii) the capability to shutdown the reactor and maintain it in a safe shutdown condition, or (iii) the capability to prevent or mitigate potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 50.67(b)(2), or 100.11. Thus, the refueling seals are not brought into scope of license renewal by 10 CFR 54.4(a)(1).
>
> Title 10 CFR 54.4(a)(2) sets forth the criterion that all non-safety-related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the safety-related functions identified in 10 CFR 54.4(a)(1) are also within the scope of license renewal.
>
> The drywell-to-reactor building refueling seal and the reactor pressure vessel (RPV)-to-drywell refueling seal, in conjunction with the refueling bulkhead, provides a watertight barrier to permit flooding above the RPV flange while preventing water from entering the drywell. Providing a watertight barrier to permit flooding above the RPV flange in support of refueling operations is not a safety-related function.
>
> The NRC notified the nuclear industry of the potential for degradation of steel containments due to leakage past the drywell to reactor building refueling seals in IE Information Notice 86-99 and NRC Generic Letter 87-05. The Dresden and Quad Cities responses to these NRC communications are described in their respective UFSARs, Section 6.2.1.2.1.2 (Drywell Corrosion Potential). The UFSAR discussions include a commitment to monitor the sand pocket drain lines during refuel activities and if leakage is detected during refuel flood-up, an inspection to determine the source will take place and further corrective measures will be initiated. Dresden/Quad Cities LRA Section 4.7.2.2 (Degradation Rates of Inaccessible Exterior Drywell Plate Surfaces) describes the calculation that projected corrosion rates for the steel drywell plates in the sand pocket area and determined that the wall thickness was

sufficient for the remainder of the 40-year license period, and determines it to be a TLAA. The TLAA disposition includes a commitment to confirm corrosion rate assumptions used in the calculations by UT inspection prior to the period of extended operation and to revise the corrosion calculation and validate that an acceptable wall thickness will remain to the end of the 60-year license operating period. These commitments support a conclusion that even if leakage past the drywell to reactor building refueling seal occurs, there will be no consequential failure of any of the safety-related functions identified in 10 CFR 54.4(a)(1). Thus, the drywell to reactor building refueling seal is not brought into license renewal scope by 10 CFR 54.4(a)(2).

Potential leakage of water past the RPV to drywell refueling seal can occur only when the reactor is in a cold shutdown condition with the reactor cavity flooded to support refueling operations. Leakage past the RPV-to-drywell seal would result in cold (<150 °F), demineralized water entering the drywell. Leakage of cold, demineralized water into the drywell cannot result in failure of any safety-related equipment because 1) there is no equipment inside the drywell whose safety-related function is credited in support of refueling operations, 2) the drywell contains a drainage system and sumps to collect and monitor unidentified leakage inside the drywell, and 3) the frequent personnel entry into the drywell that occurs during most refueling outages would result in any substantial leakage past the RPV to drywell refueling seal being noticed and corrective actions being taken. These considerations support a conclusion that even if leakage past the RPV-to-drywell refueling seal occurs, there will be no consequential failure of any of the safety-related functions identified in 10 CFR 54.4(a)(1). Thus, the RPV-to-drywell refueling seal is not brought into license renewal scope by 10 CFR 54.4(a)(2).

The refueling seals are not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection, environmental qualification, pressurized thermal shock (N/A for BWRs), anticipated transients without scram, or station blackout. Thus, the refueling seals are not brought into license renewal scope by 10 CFR 54.4(a)(3).

(b) The refueling seals are not within the scope of license renewal. As such, evaluation of their operating experience is not included within the scope of the license renewal application.

(c) The refueling seals are not within the scope of license renewal. A detailed explanation of the scoping considerations is provided in response to question 1), above. The refueling seals are passive components that are not within the scope of license renewal. As such, they have not been included within the scope of aging management review.

(d) The refueling seals are not within the scope of license renewal. As such, the refueling seals are not within the scope of an aging management program.

The staff finds the applicant's response acceptable and, therefore, RAI 2.4-3 is resolved.

2.4.1.3 Conclusions

The staff reviewed LRA Section 2.4.1 to determine whether any structural components of the primary containment that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the primary containment that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the primary containment that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.2 Reactor Building

2.4.2.1 Summary of Technical Information in the Application

The applicant described the reactor building in LRA Section 2.4.2 and provided a list of components subject to AMR in LRA Table 2.4-2.

The reactor building serves as the secondary containment. The secondary containment, in conjunction with other engineered safeguards and nuclear safety systems, limits the release of radioactive materials ensuring that site exposure resulting from a postulated design basis accident will remain below 10 CFR Part 100 guideline values. The reactor building provides secondary containment when the primary containment is in service, and provides primary containment during reactor refueling and maintenance operations when the primary containment system is open.

A single seismic Class I reactor building for each unit completely encloses both reactor and primary containment structures and auxiliary systems of the nuclear steam supply system. A major substructure within the reactor building is a reinforced concrete biological shield that surrounds each reactor and drywell portion of the primary containment. Additionally, the building houses the spent fuel pool, steam dryer/moisture separator storage pool, the new fuel storage vault, reactor cavity, reactor auxiliary equipment, refueling equipment, and reactor servicing equipment. The reactor building consists of monolithic reinforced concrete floors and walls from its foundation to the refueling floor, with a separation wall between the two units. Above this floor is the common refueling floor where the building superstructure, consisting of structural steel framing, sealed sheet metal siding, and a precast concrete roof, provides secondary containment integrity. The building is designed to contain positive internal pressure without structural failure and without pressure relief. Blow-off panels are installed as part of the reactor building superstructure siding to relieve pressure and control potential damage under short-term tornado loads. Personnel interlock/airlock access control doors have seals and are electrically controlled so that only one door in an "airlock" can be open at a time.

The containment barrier function of the reactor building is achieved through design and construction low leakage of air through the interlock/airlock doors, pipe and electrical penetration seals, and the building walls and roof. During normal operation, pressure in the building is automatically maintained at a slight negative pressure by controlling the exhaust to minimize exfiltration of airborne radioactive contamination, even under high wind conditions. The reactor building ventilation system (evaluated with HVAC-reactor building) is isolated on a secondary containment isolation signal.

Other structural components evaluated in this section include the reactor building penetrations and doors, equipment access building, the spent fuel pool, high-density spent fuel racks, crane rails, and the new fuel storage vault with associated components.

Reactor building structural items evaluated in other areas include the refueling platforms (evaluated with refueling equipment) and reactor building cranes (evaluated with cranes and hoists).

The applicant identified the following UFSAR references for additional descriptive information about the reactor building:

- Dresden Station UFSAR Section(s): 6.2.3, 3.2.1
- Quad Cities Station UFSAR Section(s): 6.2.3, 3.2.1

The applicant defined the following intended functions for the reactor building:

- Containment—controls the potential release of fission products to the external environment so that offsite consequences of design-basis events are within acceptable limits. The reactor building provides secondary containment function when the primary containment is required to be in service and provides primary containment function during reactor refueling and maintenance operations when the primary containment systems are open.

- Physical support and protection—provides physical support for safety-related and non-safety-related components, protection for all personnel and safety-related components, and components relied upon to demonstrate compliance with regulated events.

- *Protection and Radiation Shielding—provides leak-tight boundary to protect public health* and safety in the event of postulated design-basis events and radiation shielding. Protection provides protection for safe storage of new fuel.

In LRA Table 2.4-2, the applicant listed the following component groups requiring AMR for the reactor building:

Component	Component Intended Function	LRA Aging Management Ref No.
Blowout Panels	Structural Pressure Barrier	3.5.1.20
Caulking/Sealants	Structural Pressure Barrier	3.5.2.4
Concrete and Grout	Structural Support	3.5.1.29
Concrete Beams	Structural Support	3.5.1.20, 3.5.1.21
Concrete Columns	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.27
Concrete Curbs	Direct Flow	3.5.1.20
Concrete Slabs	Structural Support	3.5.1.20, 3.5.1.21
Concrete Slabs	Shelter, Protection, Shielding	3.5.1.20
Concrete Walls	Structural Support	3.5.1.20, 3.5.1.21
Concrete Walls	Shelter, Protection, Shielding	3.5.1.20
Concrete Walls	Structural Pressure Barrier	3.5.1.20
Door Seals	Flood Barrier	3.5.2.7
Fire Doors	Fire Barrier	3.3.2.4
Fire Doors (Dresden)	Shelter, Protection, Shielding	3.3.2.4
Fire Proofing	Fire Barrier	3.3.2.62
Fire Wrap	Fire Barrier	3.3.2.63
Foundations	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26

Component	Component Intended Function	LRA Aging Management Ref No.
Liners	Structural Pressure Barrier	3.5.1.23
Masonry Walls	Structural Support	3.5.1.24
Masonry Walls	Fire Barrier	3.3.2.129
Masonry Walls	Missile Barrier	3.5.1.24
Masonry Walls	HELB Shielding	3.5.1.24
Metal Decking	Structural Support	3.5.1.20
Metal Siding	Shelter, Protection, Shielding	3.5.1.20
Metal Siding	Structural Pressure Barrier	3.5.1.20
Misc. Steel (Grating, Ladders)	Structural Support	3.5.1.20
Misc. Steel (Kick Plates, Ladders, Platforms, Stairs, Railing)	Non-S/R Structural Support	3.5.1.20
Neutron-Absorbing Sheets	Absorb Neutrons	3.3.1.12, 3.3.1.9
New Fuel Racks	Structural Support	3.5.2.10
Penetration Seals (includes Secondary Containment Boot Seal)	Fire Barrier	3.3.1.18
Penetration Sleeves	Non-S/R Structural Support	3.5.1.20
Precast Concrete Panels	Structural Support	3.5.1.20
Precast Concrete Panels	Shelter, Protection, Shielding	3.5.1.20
Roofing	Shelter, Protection, Shielding	3.5.2.11
Secondary Containment Boot Seals	Structural Pressure Barrier	3.5.2.12
Steel Doors	Shelter, Protection, Shielding	3.5.1.20
Steel Doors	Flood Barrier	3.5.1.20
Steel Doors	Structural Pressure Barrier	3.5.1.20
Steel Embedments	Structural Support	3.5.1.20
Steel Panels and Cabinets	Structural Support	3.5.1.20
Steel Plates	Missile Barrier	3.5.1.20
Steel Plates	HELB Shielding	3.5.1.20
Steel Plates	Direct Flow	3.5.1.20
Storage Racks	Structural Support	3.3.1.11
Structural Steel (includes flued head anchor support)	Structural Support	3.5.1.20
Structural Steel	HELB Shielding	3.5.1.20
Structural Steel	Pipe Whip Restraint	3.5.1.20
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the reactor building are provided in LRA Sections 3.3 and 3.5.

2.4.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2, Dresden Station UFSAR Sections 6.2.3 and 3.2.1, and Quad Cities Station UFSAR Sections 6.2.3 and 3.2.1 to determine whether the reactor building structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Table 2.4-2 presents a comprehensive list of component groups. However, for certain components the staff requires further explanation to complete its evaluation. The applicant was requested to submit the following information in RAI 2.4-4.

(a) a description of "Neutron-Absorbing Sheets," and an explanation why it is included as a structural component when the aging management results are documented in LRA 3.3—Auxiliary Systems

(b) a description of "Secondary Containment Boot Seals"

(c) verification that "Storage Racks" refers to spent fuel racks, and an explanation why it is included as a structural component when the aging management results are documented in LRA 3.3—Auxiliary Systems

In its response to RAI 2.4-4, the applicant stated the following:

> (a) The spent fuel pool racks contain neutron absorbing sheets that maintain a k_{eff} no greater than .95 when all of the spent fuel is in place. These neutron adsorbing sheets are made of boral at Dresden and boraflex at Quad Cities and are evaluated in Sections VII.A2.1-b and VII.A1.1-a of NUREG-1801, Generic Aging Lessons Learned Report, Volume 2. Exelon assigned an aging management reference for these components to Table 3.3.1, Aging Management Programs Evaluated in NUREG-1801 That Are Relied Upon for License Renewal for the Auxiliary Systems, because NUREG-1801 directs licensees to this same reference. Table 3.3.1 of the Dresden and Quad Cities License Renewal Application is a recreation of all BWR-related line items found in Table 3 of NUREG-1801, Volume 1. NUREG-1801 line items VII.A2.1-b and VII.A1.1-a are assigned to Table 3 of NUREG-1801, Volume 1. Exelon assigned these structural components to aging management references for auxiliary systems only because it is an expectation of NUREG-1801.
>
> (b) The Reactor Building serves as the secondary containment whose primary purpose is to minimize the ground level release of airborne radioactive materials and to provide for a controlled, elevated release of the building atmosphere under accident conditions. To achieve this function, the Reactor Building is designed to maintain an internal negative pressure $\geq$¼ inch H_2O under neutral wind conditions. Reactor Building pipe penetrations are sealed as necessary to minimize air in leakage and maintain the negative internal pressure. These pipe penetration seals are called "Secondary Containment Boot Seals." Boot seals are fabricated with a silicone rubber material that allows pipe movement while providing a seal between the pipe and the Reactor Building.
>
> (c) "Storage Racks" refer to "Spent Fuel Storage Racks" and are consistent with the components evaluated in Section VII.A2.1-c of NUREG-1801, Volume 2. At Dresden and Quad Cities, Spent Fuel Storage Racks are treated as structures, rather than part of an auxiliary system. Therefore, they were included in Section 2.4 of the LRA, the scoping and screening results for structures. The NUREG-1801 line item for Spent Fuel Storage Racks (VII.A2.1-c) is assigned

to Table 3 of NUREG-1801, Volume 1 for Auxiliary Systems. Exelon credited the aging management programs in NUREG-1801 for spent fuel storage racks. Therefore the aging management reference for the spent fuel racks listed in Section 2.4 for structures cross-references an aging management program in the NUREG-1801 section for auxiliary systems.

The additional information provided by the applicant in its RAI response sufficiently describes the three components and how each is covered in the AMR. The staff concludes that the applicant has appropriately addressed the "Neutron-Absorbing Sheets," "Secondary Containment Boot Seals," and "Storage Racks" in its scoping and screening review and, therefore, considers RAI 2.4-4 resolved.

2.4.2.3 Conclusions

The staff reviewed LRA Section 2.4.2 to determine whether any structural components of the reactor building that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the reactor building that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the reactor building that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3 Main Control Room and Auxiliary Electric Equipment Room

2.4.3.1 Summary of Technical Information in the Application

The applicant described the main control room and auxiliary electric equipment room in LRA Section 2.4.3 and provided a list of components subject to an AMR in LRA Table 2.4-3.

The main control room and auxiliary electric equipment room provide protection and structural support of the control equipment required for normal station operation and for shutdown of the plant under abnormal conditions. The main control room provides protection to safety-related components and to operating personnel from radiation exposure, high energy line break (HELB), tornado, and internally generated missiles.

The main control room and auxiliary electric equipment room contain the controls for normal station operation and for shutdown of the plant under abnormal conditions. This combined structure is seismic Class I, primarily reinforced concrete, capable of accommodating loading conditions imposed during any design-basis accident (DBA) without failure.

The Dresden main control room has reinforced concrete and reinforced concrete block walls, with a reinforced concrete floor and ceiling. The Dresden auxiliary electric equipment room serves as the cable spreading room for both units and houses the computer room. It is classified as a Class II structure, which has been investigated to assure that the integrity of the Class I items are not compromised. The auxiliary electrical equipment room is a reinforced concrete structure with structural steel support elements, a reinforced concrete floor, and the control room floor above as its ceiling.

The Quad Cities main control room, auxiliary electrical equipment room, and the cable spreading room complex is a Class I structure designed to accommodate loading conditions imposed during any DBA without failure. The control room is heavy-walled, constructed of ordinary reinforced concrete and of magnetite (high-density) concrete, with ordinary reinforced concrete for the control room and cable spreading room floor, and ordinary reinforced concrete for the auxiliary electric equipment room floor slab and roof slab. The cable spreading room is located directly below the main control room and above the auxiliary electrical equipment room and is used solely for the routing of instrument and control cables. The auxiliary electrical equipment room contains alternate safe shutdown equipment and the cabling from the tunnel below to the cable spreading room.

The applicant identified the following UFSAR references for additional descriptive information about the main control room and auxiliary electric equipment room:

- Dresden Station UFSAR Section(s): 3.1.1.3.1, 3.2.1, 3.2.6, and 6.4
- Quad Cities Station UFSAR Section(s): 3.1.3.1, 3.2.1, and 6.4

The applicant defined the following intended functions for the main control room and auxiliary electric equipment room:

- Physical support and protection—provides physical support and protection for safety-related components and components relied upon to demonstrate compliance with fire protection and SBO-regulated events.

- Personnel protection—provides shelter, protection, and radiation shielding for essential operating personnel.

In LRA Table 2.4-3, the applicant listed the following component groups requiring AMR for the main control room and auxiliary electric equipment room:

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete and Grout	Structural Support	3.5.1.29
Concrete Beams (Quad Cities)	Structural Support	3.5.1.20
Concrete Columns (Quad Cities)	Structural Support	3.5.1.20
Concrete Curbs (Dresden)	Direct Flow	3.5.1.20
Concrete Manholes (Dresden)	Structural Support	3.5.1.20
Concrete Manholes (Dresden)	Fire Barrier	3.3.1.28
Concrete Slabs	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.27
Concrete Slabs	Shelter, Protection, Shielding	3.5.1.20, 3.5.1.21, 3.5.1.27
Concrete Walls	Structural Support	3.5.1.20
Concrete Walls	Shelter, Protection, Shielding	3.5.1.20, 3.5.1.27

Component	Component Intended Function	LRA Aging Management Ref No.
Caulking/Sealants	Structural Pressure Barrier	3.5.2.3
Fire Doors	Fire Barrier	3.3.2.4
Fire Proofing	Fire Barrier	3.3.2.62
Fire Wrap	Fire Barrier	3.3.2.63
Foundations	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26
Masonry Walls	Structural Support	3.5.1.24
Masonry Walls	Fire Barrier	3.3.2.129
Masonry Walls	Shelter, Protection, Shielding	3.5.1.24
Masonry Walls	Missile Barrier	3.5.1.24
Metal Decking (Dresden)	Structural Support	3.5.1.20
Misc. Steel (Quad Cities)	Structural Support	3.5.1.20
Penetration Seals	Fire Barrier	3.3.1.18
Penetration Seals (Dresden)	Non-S/R Structural Support	3.3.1.18
Penetration Sleeves	Non-S/R Structural Support	3.5.1.20
Roofing (Quad Cities)	Shelter, Protection, Shielding	3.5.2.11
Steel Embedments	Structural Support	3.5.1.20
Steel Panels and Cabinets	Structural Support	3.5.1.20
Structural Steel	Structural Support	3.5.1.20
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the main control room and auxiliary electric equipment room are provided in LRA Sections 3.3 and 3.5.

2.4.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3, Dresden Station UFSAR Sections 3.1.1.3.1, 3.2.1, 3.2.6, and 6.4, and Quad Cities Station UFSAR Sections 3.1.3.1, 3.2.1, and 6.4 to determine whether the main control room and auxiliary electric equipment room structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR, to determine if any components were omitted.

LRA Table 2.4-3 presents a list of structural components for the main control room and auxiliary electric equipment room. In response to RAI 2.3.2.9-3, the applicant added caulking/sealants as a component to be in scope. The staff did not identity other omissions made by the applicant.

2.4.3.3 Conclusions

The staff reviewed LRA Section 2.4.3 to determine whether any structural components of the main control room and auxiliary electric equipment room that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the main control room and auxiliary electric equipment room that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the main control room and auxiliary electric equipment room that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.4 Turbine Building

2.4.4.1 Summary of Technical Information in the Application

The applicant described the turbine building in LRA Section 2.4.4 and provided a list of components subject to an AMR in LRA Table 2.4-4.

The purpose of the turbine building is the protection of the main turbine generators and other plant equipment from environmental hazards and missiles, as well as providing structural support for equipment and radiation shielding.

The turbine building is a common structure shared by both units at each station. Located in one side or half of the turbine building are the turbine-generator, exciter, condenser, feedwater heaters, feedwater and condensate pumps, demineralizer system, condenser circulating system, and electrical switchgear. Duplicate equipment and systems for the other unit are located in the other half of the building. Each turbine building superstructure consists of a structural steel frame-type design with metal siding from the turbine floor up. All Class I components in the turbine building are located in levels below the turbine main floor within a reinforced concrete structure with capabilities similar to the reactor building. Large equipment, located in the superstructure, is designed and supported to preclude failure that could damage equipment related to the ECCS systems or cause significant release of radioactivity.

The building is a Class II structure and provides Class I protection in areas where Class I items and associated SSCs are located. Exceptions are the swing emergency diesel generators and Quad Cities emergency diesel generators which are evaluated in the emergency diesel generator room. The turbine building cranes are evaluated with cranes and hoists.

The applicant identified the following UFSAR references for additional descriptive information about the turbine building:

- Dresden Station UFSAR Section(s): 1.2.2.2
- Quad Cities Station UFSAR Section(s): 1.2.2.2

The applicant defined the following intended functions for the turbine building.

- Physical support and protection—provides physical support and protection for safety-related components and components relied upon to demonstrate compliance with regulated events.
- Radiation shielding—provides shielding that protects personnel and components from radiation.
- Protection—provides missile barrier protection for internally and externally generated events and the flood protection for SSCs.

In LRA Table 2.4-4, the applicant listed the following component groups requiring AMR for the turbine building:

Component	Component Intended Function	LRA Aging Management Ref No.
Caulking/Sealants	Structural Pressure Barrier	3.5.2.3, 3.5.2.4
Concrete and Grout	Structural Support	3.5.1.29
Concrete and Grout	Non-S/R Structural Support	3.5.1.29
Concrete Beams	Structural Support	3.5.1.20, 3.5.1.27
Concrete Columns	Structural Support	3.5.1.20
Concrete Curbs	Direct Flow	3.5.1.20
Concrete Manholes	Structural Support	3.5.1.20
Concrete Manholes	Shelter, Protection, Shielding	3.5.1.20
Concrete Slabs	Structural Support	3.5.1.20
Concrete Walls	Structural Support	3.5.1.20
Fire Doors	Fire Barrier	3.3.1.18
Fire Proofing	Fire Barrier	3.3.2.62
Fire Wrap	Fire Barrier	3.3.2.63
Foundations	Structural Support	3.5.1.20, 3.5.1.25, 3.5.1.26
Masonry Walls	Structural Support	3.5.1.24
Masonry Walls	Fire Barrier	3.3.2.129
Masonry Walls	Shelter, Protection, Shielding	3.5.1.24
Masonry Walls	Non-S/R Structural Support	3.5.1.24
Metal Siding	Shelter, Protection, Shielding	3.5.1.20
Misc. Steel (includes Gratings, Ladders, Platforms, Railings, Stairs, Kickplates)	Non-S/R Structural Support	3.5.1.20
Penetration Seals	Flood Barrier	3.3.1.18
Penetration Sleeves	Non-S/R Structural Support	3.5.1.20
Precast Concrete Panels	Structural Support	3.5.1.20
Precast Concrete Panels	Non-S/R Structural Support	3.5.1.20

Component	Component Intended Function	LRA Aging Management Ref No.
Roofing	Shelter, Protection, Shielding	3.5.2.11
Steel Doors	Flood Barrier	3.5.1.20
Steel Doors	Non-S/R Structural Support	3.5.1.20
Steel Doors	Structural Pressure Barrier	3.5.1.20
Steel Embedments	Structural Support	3.5.1.20
Steel Panels and Cabinets	Structural Support	3.5.1.20
Steel Plates	Shelter, Protection, Shielding	3.5.1.20
Steel Plates (Dresden)	Flood Barrier	3.5.1.20
Structural Steel	Structural Support	3.5.1.20
Structural Steel	Pipe Whip Restraint	3.5.1.20
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the turbine building are provided in LRA Sections 3.3 and 3.5.

2.4.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4, Dresden Station UFSAR Section 1.2.2.2, and Quad Cities Station UFSAR Section 1.2.2.2 to determine whether the turbine building structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Table 2.4-4 presents a comprehensive list of structural components for the turbine building. The staff did not identify any omissions made by the applicant.

2.4.4.3 Conclusions

The staff reviewed LRA Section 2.4.4 to determine whether any structural components of the turbine building that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the turbine building that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the turbine building that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.5 Diesel Generator Buildings

2.4.5.1 Summary of Technical Information in the Application

The applicant described the diesel generator buildings in LRA Section 2.4.5 and provided a list of components subject to an AMR in LRA Table 2.4-5. The purpose of the diesel generator buildings is to provide structural support and protection of the emergency diesel generators and HPCI system components (Dresden only).

The diesel generator buildings contain the Dresden Unit 2/3 (swing) emergency diesel generator and HPCI building (a structure which includes both the swing diesel generator and HPCI system components) and the Quad Cities Unit ½ and ½ (swing) emergency diesel generator rooms.

The Dresden diesel generator and HPCI building is a Class I concrete structure that houses the Unit 2/3 (swing) emergency diesel generator, HPCI system equipment, and other safe shutdown equipment. It abuts the Unit 3 reactor building and shares the reactor building wall on its north side. The Dresden Unit 2 and 3 emergency diesel generators are housed in the turbine building.

The three Quad Cities diesel generator rooms are Class II concrete structures that have been evaluated to ensure that they have the capability to protect safety-related components. The rooms provide structural support and protection of the emergency diesel generators as well as fire protection of adjacent safety-related structures. The Unit 1 diesel generator room is located in the southeast corner of the Unit 1 section of the turbine building. The Unit 2 diesel generator room is located in the northeast corner of the Unit 2 section of the turbine building. The Unit ½ (swing) diesel generator room is adjacent to the reactor building. It is centered on the reactor building east wall, which is shared with the Unit ½ diesel generator room.

The applicant identified the following UFSAR references for additional descriptive information about the diesel generator buildings:

- Dresden Station UFSAR Section(s): 3.2.6, 8.3
- Quad Cities Station UFSAR Section(s): 3.2.6, 8.3.1.6.1

The applicant defined the following intended functions for the diesel generator buildings.

- Physical support and protection—provides physical support and protection for safety-related components and components relied upon to demonstrate compliance with fire protection and SBO-regulated events (Dresden only).

- Containment—provides a leak-tight barrier protecting the health and safety of the public in the event of any postulated design-basis events and also provides a secondary containment boundary (Dresden 2/3 diesel generator room only)

- Protection—provides missile barrier for internally and externally generated events.

In LRA Table 2.4-5, the applicant listed the following component groups requiring AMR for the diesel generator buildings:

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete and Grout	Structural Support	3.5.1.29
Concrete and Grout	Non-S/R Structural Support	3.5.1.29
Concrete Beams (Dresden)	Structural Support	3.5.1.20
Concrete Curbs	Direct Flow	3.5.1.20
Concrete Shield Plugs (Dresden)	Structural Support	3.5.1.20
Concrete Shield Plugs (Dresden)	Fire Barrier	3.3.1.28
Concrete Shield Plugs (Dresden)	Shelter, Protection, Shielding	3.5.1.20
Concrete Slabs	Structural Support	3.5.1.20
Concrete Slabs	Shelter, Protection, Shielding	3.5.1.20
Concrete Walls	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.27
Concrete Walls	Shelter, Protection, Shielding	3.5.1.20
Concrete Walls	Missile Barrier	3.5.1.20
Fire Doors	Fire Barrier	3.3.1.18
Fire Proofing	Fire Barrier	3.3.2.62
Fire Wrap	Fire Barrier	3.3.2.63
Foundations (Dresden)	Structural Support	3.5.1.20
Masonry Walls (Dresden)	Structural Support	3.5.1.24
Masonry Walls (Dresden)	Fire Barrier	3.3.2.129
Metal Decking (Quad Cities)	Structural Support	3.5.1.20
Misc. Steel (includes Ladders, Railings, Stairs, Gratings, Kick Plates, Platforms)	Non-S/R Structural Support	3.5.1.20
Penetration Seals (Dresden)	Fire Barrier	3.3.1.18
Penetration Sleeves	Non-S/R Structural Support	3.5.1.20
Penetration Sleeves (Quad Cities)	Structural Pressure Barrier	3.5.1.20
Steel Doors (Dresden)	Structural Pressure Barrier	3.5.1.20
Steel Embedments	Structural Support	3.5.1.20
Steel Panels and Cabinets	Structural Support	3.5.1.20
Steel Plates (Dresden)	Direct Flow	3.5.1.20
Structural Steel	Structural Support	3.5.1.20
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the diesel generator buildings are provided in LRA Sections 3.3 and 3.5.

2.4.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.5, Dresden Station UFSAR Sections 3.2.6 and 8.3, and Quad Cities Station UFSAR Sections 3.2.6 and 8.3.1.6.1 to determine whether the diesel generator buildings structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR, to determine if any components were omitted.

LRA Table 2.4-5 presents a comprehensive list of structural components for the diesel generator buildings. The staff did not identify any omissions made by the applicant.

2.4.5.3 Conclusions

The staff reviewed LRA Section 2.4.5 to determine whether any structural components of the diesel generator buildings that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the diesel generator buildings that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the diesel generator buildings that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.6 Station Blackout Building and Yard Structures

2.4.6.1 Summary of Technical Information in the Application

The applicant described the station blackout (SBO) building and yard structures in LRA Section 2.4.6 and provided a list of components subject to an AMR in LRA Table 2.4-6.

The SBO building provides structural support and environmental protection for the SBO diesel generators and associated components. The offsite power structures are to provide sufficient capacity and capability to start and operate safety-related equipment.

Other structures grouped with the SBO building for evaluation are offsite power structures and foundations associated with the reserve auxiliary transformers, dead-end structures, bus duct supports and intermediate transmission towers. For both stations, the bus duct supports, dead end structures, and intermediate transmission towers are either galvanized or coated steel with reinforced concrete foundations. Foundations for supporting transformers and circuit breakers are also reinforced concrete.

Structural boundaries include the physical extent of the circuit breaker foundations in the switchyards serving the reserve auxiliary transformer, 345-kV and 138-kV dead end structures, intermediate transmission towers serving the reserve auxiliary transformer, 345-kV and 138-kV dead end structures serving adjacent to the reserve auxiliary transformer (Dresden only), reserve auxiliary transformer foundations, and bus ducts and their supports and foundations terminating at the turbine building (Dresden) and terminating at the diesel generator/turbine building (Quad Cities).

The Dresden SBO building is a Class I structure that houses the SBO diesel generators and safety-related components, including the Unit 2 alternate 125V DC batteries. It is a heavy-walled, reinforced concrete structure capable of protecting its contents from weather-related events that could initiate an SBO event. The underground diesel oil tank foundation on the eastern side of the building supports the 15,000-gallon fuel tank.

The Quad Cities SBO building protects the diesel generators and associated components from weather-related events, which could initiate an SBO event, and provides physical isolation from safety-related components. It is a two-floor structure consisting of a reinforced concrete ground floor slab/foundation, steel framed exterior walls with corrugated metal siding, metal deck supported concrete slab second floor, and a roof consisting of a fully adhered single-ply system on rigid insulation supported by metal decking. The SBO diesel generators are supported within the building by independent reinforced concrete foundation slabs. Fire-rated block walls separate the Unit 1 and 2 diesel generator rooms, the day tank rooms, and the second floor battery rooms.

The applicant identified the following UFSAR references for additional descriptive information about the SBO building and yard structures:

- Dresden Station UFSAR Section(s): 9.5.9, 8.2
- Quad Cities Station UFSAR Section(s): 8.3.1.9, 8.2

The applicant defined the following intended function for the SBO building and yard structures.

- Physical support and protection—provides physical support and protection for safety-related components and components relied upon to demonstrate compliance with the SBO regulated event. For Quad Cities only, the structure also provides protection for components relied upon to demonstrate compliance with the fire protection regulated event.

In LRA Table 2.4-6, the applicant listed the following component groups requiring AMR for the SBO building and yard structures:

Component	Component Intended Function	LRA Aging Management Ref No.
Bus Duct Covers	Non-S/R Structural Support	3.5.2.1
Bus Duct Supports	Non-S/R Structural Support	3.5.2.2
Caulking/Sealants	Flood Barrier	3.5.2.4
Caulking/Sealants	Expansion/Separation	3.5.2.4

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete and Grout	Structural Support	3.5.1.29
Concrete and Grout	Non-S/R Structural Support	3.5.1.29
Concrete Curbs	Direct Flow	3.5.1.20
Concrete Manholes (Quad Cities)	Structural Support	3.5.1.20
Concrete Manholes (Quad Cities)	Non-S/R Structural Support	3.5.1.20, 3.5.1.21
Concrete Slabs	Structural Support	3.5.1.20
Concrete Slabs	Non-S/R Structural Support	3.5.1.20
Concrete Walls (Dresden)	Structural Support	3.5.1.20, 3.5.1.21
Dead End Structures	Non-S/R Structural Support	3.5.2.6
Doors	Fire Barrier	3.3.1.18
Fire Proofing	Fire Barrier	3.3.2.62
Fire Wrap	Fire Barrier	3.3.2.63
Foundations	Structural Support	3.5.1.20, 3.5.1.25, 3.5.1.26, 3.5.1.27
Foundations	Non-S/R Structural Support	3.5.1.20
Masonry Walls	Structural Support	3.5.1.24
Masonry Walls	Fire Barrier	3.3.2.129
Masonry Walls	Shelter, Protection, Shielding	3.5.1.24
Metal Decking	Non-S/R Structural Support	3.5.1.20
Metal Decking (Dresden)	Shelter, Protection, Shielding	3.5.1.20
Misc. Steel (Dresden—includes Gratings, Kick Plates, Ladders, Platforms, Railings)	Non-S/R Structural Support	3.5.1.20
Penetration Seals (Quad Cities)	Fire Barrier	3.3.1.18
Penetration Seals (Quad Cities)	Expansion/Separation	3.3.1.18
Penetration Sleeves	Non-S/R Structural Support	3.5.1.20
Steel Embedments	Structural Support	3.5.1.20
Steel Panels and Cabinets	Non-S/R Structural Support	3.5.1.20
Steel Piles (Dresden)	Non-S/R Structural Support	3.3.2.207
Steel Plates (Dresden)	Missile Barrier	3.5.1.20
Structural Steel	Non-S/R Structural Support	3.5.1.20
Transmission Towers	Non-S/R Structural Support	3.5.2.16
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the SBO building and yard structures are provided in LRA Sections 3.3 and 3.5.

2.4.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.6, Dresden Station UFSAR Sections 9.5.9 and 8.2, and Quad Cities Station UFSAR Sections 8.3.1.9 and 8.2 to determine whether the SBO building and yard structures structural components within the scope of license renewal and subject to an

AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

Based on information provided in LRA Section 2.4.6, the exact scope of structural components included in this section was not clear to the staff. Also, clarification was needed for several "Components" listed in Table 2.4-6.

In order to complete the screening review for the SBO building and yard structures, the staff requested, in RAI 2.4-5, the applicant to submit the following information:

(a) LRA Table 2.4-6 lists the following components requiring an AMR—"bus duct covers," "bus duct supports," "dead-end structures," and "transmission towers." These appear to be the yard structures. The staff asked the applicant to verify that this interpretation is correct, or to describe more completely the yard structures included in the scope of this section.

(b) The staff has assumed that the foundations for the bus duct supports, dead end structures, and transmission towers, and also for the transformers and circuit breakers are included with the SBO building foundation under the LRA Table 2.4-6 component group "foundations." The staff asked the applicant to verify that this interpretation is correct, or to describe more completely the foundations included in the scope of this section.

(c) The component "steel piles (Dresden only)" is also listed in LRA Table 2.4-6. LRA Section 2.4.6 provides no description of the steel piles. The staff asked the applicant to describe the steel piles at Dresden and define their intended function(s). The applicant should also explain why the "Aging Management Ref" for the steel piles is 3.3.2.207. LRA Section 3.3 covers Auxiliary Systems. The staff believes this may be a documentation error in the LRA.

In its response to RAI 2.4-5, the applicant stated the following:

> Exelon has reviewed LRA Section 2.4.6, Table 2.4-6, and provides the following clarifications:
>
> (a) Components Groups "Bus Duct Covers," "Bus Duct Supports," "Dead End Structures," and "Transmission Towers" are yard structures that require aging management review. Initially, these were not included within the scope of license renewal and were included in Miscellaneous Yard Structures discussed in the response to RAI 2.4-1. The Station Blackout offsite power feeds were not initially included in scope. However, these specific component groups were later added to the scope of License Renewal to comply with interim staff guidance concerning scoping of offsite power systems necessary to support the Station Blackout Rule (10 CFR 50.63). As such, they were evaluated with the Station Blackout Building in section 2.4.6 of the LRA. These component groups are not included in "Miscellaneous Yard Structures" shown on Table 2.2-1, which is a grouping of yard structures that do not satisfy the requirements of 10 CFR 54(a).
>
> (b) Table 2.4-6, Component Groups Requiring Aging Management Review - Station Blackout Building, contains two foundation groups. The foundation group with the "Non-S/R Structural

Support" component function includes the foundations for the bus duct supports, dead end structures, and breaker foundations serving the Reserve Auxiliary Transformers and Transmission Towers. The foundation group with the "Structural Support" component function includes the Station Blackout Building foundations.

(c) The component group "steel piles (Dresden only)" listed in LRA Table 2.4-6 are associated with a transmission tower that carries power transmission cables from the switch yard to Reserve Auxiliary Transformer 22 located outside of the Turbine Building. The concrete foundation for this transmission tower is supported by seven steel "H" piles resting on bedrock. The steel piles provide structural support for the transmission tower and associated concrete foundation. Aging Management Reference 3.3.2.207 accurately evaluates the aging of these steel piles. However, the aging management reference for these steel piles was inadvertently included in LRA Table 3.3-2 and should have been included in LRA Table 3.5-2.

Table 2.4-6 line item for Steel Piles (Dresden only) should have read as follows:

Component	Component Intended Function	LRA Aging Management Ref No.
Steel Piles (Dresden only)	Non-S/R Structural Support	3.5.2.17

Table 3.5-2 should have included a new line item that is identical to 3.3.2.207, as follows:

Ref No.	Component Group	Material	Environment	Aging Effect/Mechanism	Aging Management Program	Discussion
3.5.2.17	Steel Piles	Carbon Steel	Soil and groundwater	None	None	NUREG-1801 does not address carbon steel piles in a soil and ground water environment. The intended function of steel piles driven in undisturbed soils is not affected by corrosion.

The additional information provided by the applicant in its RAI response sufficiently answers the three questions posed by the staff and how each is covered in the AMR. The staff concludes that the applicant has appropriately addressed these components in its scoping and screening review. The staff's evaluation of the AMR for "steel piles (Dresden only)" is in Section 3.5 of this SER. Therefore, RAI 2.4-5, is resolved.

2.4.6.3 Conclusions

The staff reviewed LRA Section 2.4.6 to determine whether any structural components of the SBO building and yard structures that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the SBO building and yard structures that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the SBO building and yard structures that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.7 Isolation Condenser Pump House (Dresden)

2.4.7.1 Summary of Technical Information in the Application

The applicant described the isolation condenser pump house (Dresden) in LRA Section 2.4.7 and provided a list of components subject to an AMR in LRA Table 2.4-7.

The isolation condenser pump house provides structural support and environmental protection for the two diesel-driven isolation condenser makeup water pumps.

The isolation condenser pump house is a two-floor Class II structure with the first floor at grade and the other floor being a reinforced concrete basement. The above-grade exterior north, south, and east walls, as well as an interior center wall, are constructed of concrete block. The west wall that borders the reactor building is reinforced concrete with Rodofoam seismic gap separation at the reactor building wall. The first floor is a metal deck supported concrete slab. The roof consists of a single-ply system on rigid insulation supported by metal decking on structural steel.

The applicant identified the following UFSAR references for additional descriptive information about the isolation condenser pump house (Dresden):

- Dresden Station UFSAR Section(s): 5.4.6
- Quad Cities UFSAR Section(s): Not Applicable

The applicant defined the following intended function for the isolation condenser pump house (Dresden).

- Credited in regulated events—provides physical support and protection for components relied upon to demonstrate compliance with the fire protection regulated event.

In LRA Table 2.4-7, the applicant listed the following component groups as requiring AMR for the isolation condenser pump house (Dresden):

Component	Component Intended Function	LRA Aging Management Ref No.
Caulking/Sealants (Dresden)	Expansion/Separation	3.5.2.4
Concrete Duct Banks (Dresden)	Non-S/R Structural Support	3.5.1.21
Concrete Walls (Dresden)	Structural Support	3.5.1.20
Concrete Walls (Dresden)	Non-S/R Structural Support	3.5.1.20
Doors (Dresden)	Fire Barrier	3.3.1.18
Foundations (Dresden)	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26

Component	Component Intended Function	LRA Aging Management Ref No.
Foundations (Dresden)	Non-S/R Structural Support	3.5.1.20
Masonry Walls (Dresden)	Structural Support	3.5.1.24
Masonry Walls (Dresden)	Fire Barrier	3.3.2.129
Masonry Walls (Dresden)	Non-S/R Structural Support	3.5.1.24
Metal Decking (Dresden)	Shelter, Protection, Shielding	3.5.1.20
Metal Decking (Dresden)	Non-S/R Structural Support	3.5.1.20
Penetration Seals (Dresden)	Fire Barrier	3.3.1.18
Penetration Sleeves (Dresden)	Non-S/R Structural Support	3.5.1.20
Roofing (Dresden)	Shelter, Protection, Shielding	3.5.2.11
Seismic Gap Filler (Dresden)	Expansion/Separation	3.5.2.13
Steel Doors (Dresden)	Non-S/R Structural Support	3.5.1.20
Steel Embedments (Dresden)	Structural Support	3.5.1.20
Steel Panels and Cabinets (Dresden)	Non-S/R Structural Support	3.5.1.20
Structural Steel (Dresden)	Non-S/R Structural Support	3.5.1.20
Walls, Ceilings, Floors (Dresden)	Fire Barrier	3.3.1.28

The applicant's AMR results for the isolation condenser pump house are provided in LRA Sections 3.3 and 3.5.

2.4.7.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7 and Dresden Station UFSAR Section 5.4.6 to determine whether the isolation condenser pump house (Dresden only) structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR, to determine if any components were omitted.

LRA Table 2.4-7 presents a comprehensive list of structural components for the isolation condenser pump house (Dresden). The staff did not identify any omissions made by the applicant.

2.4.7.3 Conclusions

The staff reviewed LRA Section 2.4.7 to determine whether any structural components of the isolation condenser pump house (Dresden only) that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the isolation condenser pump house (Dresden only) that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the isolation condenser pump house (Dresden only) that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.8 Makeup Demineralizer Building (Dresden)

2.4.8.1 Summary of Technical Information in the Application

The applicant described the makeup demineralizer building (Dresden) in LRA Section 2.4.8 and provided a list of components subject to an AMR in LRA Table 2.4-8. The makeup demineralizer building at Dresden provides support and protection for instrumentation required for remote monitoring of water level of the "B" contaminated condensate storage tank in the event that the main control room is evacuated due to fire.

The makeup demineralizer building is a preengineered steel building that includes an interior reinforced concrete slab, anchor bolt hardware, instrument rack, and foundation support for the level indicator.

The applicant did not identify any UFSAR references for the Dresden makeup demineralizer building.

The applicant defined the following intended function for the makeup demineralizer building (Dresden).

- Physical support and protection—provides physical support and protection for components relied upon to demonstrate compliance with the fire protection regulated event.

In LRA Table 2.4-8, the applicant listed the following component groups requiring AMR for the makeup demineralizer building (Dresden):

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete and Grout (Dresden)	Structural Support	3.5.1.29
Concrete Slabs (Dresden)	Structural Support	3.5.1.20
Concrete Slabs (Dresden)	Non-S/R Structural Support	3.5.1.20
Foundations (Dresden)	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26, 3.5.1.27
Foundations (Dresden)	Non-S/R Structural Support	3.5.1.20
Metal Decking (Dresden)	Shelter, Protection, Shielding	3.5.1.20
Metal Siding (Dresden)	Shelter, Protection, Shielding	3.5.1.20
Steel Doors (Dresden)	Shelter, Protection, Shielding	3.5.1.20

Component	Component Intended Function	LRA Aging Management Ref No.
Steel Panels and Cabinets (Dresden)	Structural Support	3.5.1.20
Structural Steel (Dresden)	Non-S/R Structural Support	3.5.1.20

The applicant's AMR results for the makeup demineralizer building are provided in LRA Section 3.5.

2.4.8.2 Staff Evaluation

The staff reviewed LRA Section 2.4.8 to determine whether the makeup demineralizer building (Dresden) structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Table 2.4-8 presents a comprehensive list of structural components for the makeup demineralizer building (Dresden). The staff did not identify any omissions made by the applicant.

2.4.8.3 Conclusions

The staff reviewed LRA Section 2.4.8 to determine whether any structural components of the makeup demineralizer building (Dresden) that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the makeup demineralizer building (Dresden) that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the makeup demineralizer building (Dresden) that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.9 Radwaste Floor Drain Surge Tank

2.4.9.1 Summary of Technical Information in the Application

The applicant described the radwaste floor drain surge tank in LRA Section 2.4.9 and provided a list of components subject to an AMR in LRA Table 2.4-9. The floor drain surge tank provides the necessary surge volume for the floor drain system, which collects potentially radioactive liquids.

The aboveground floor drain surge tank has thick reinforced concrete walls for shielding and electric heaters to prevent freezing during cold weather. The tank bottom is sloped to reduce sludge buildup. The floor drain surge tank is a Class I structure and is, therefore, not considered an aboveground tank for the purpose of the curies content requirements. The floor drain surge tank includes the attached pump house structure, foundations, floors, walls, roof, and stainless steel liner.

The applicant identified the following UFSAR references for additional descriptive information about the radwaste floor drain surge tank:

- Dresden Station UFSAR Section(s): 11.2, 3.2.1
- Quad Cities Station UFSAR Section(s): 11.2

The applicant defined the following intended function for the radwaste floor drain surge tank:

- Radioactive fluid containment—provides physical barrier and support to contain potentially radioactive liquid waste.

In LRA Table 2.4-9, the applicant listed the following component groups requiring AMR for the radwaste floor drain surge tank:

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete Manholes	Structural Support	3.5.1.20, 3.5.1.21
Concrete Manholes	Shelter, Protection, Shielding	3.5.1.20
Concrete Slabs	Structural Support	3.5.1.20
Concrete Slabs	Shelter, Protection, Shielding	3.5.1.20
Concrete Walls	Structural Support	3.5.1.20
Concrete Walls	Shelter, Protection, Shielding	3.5.1.20
Foundations	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26
Liners	Structural Pressure Barrier	3.5.1.28
Steel Embedments	Structural Support	3.5.1.20

The applicant's AMR results for the radwaste floor drain surge tank are provided in LRA Section 3.5.

2.4.9.2 Staff Evaluation

The staff reviewed LRA Section 2.4.9, Dresden Station UFSAR Sections 11.2 and 3.2.1, and Quad Cities Station UFSAR Section 11.2 to determine whether the radwaste floor drain surge tank structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Table 2.4-9 presents a comprehensive list of structural components for the radwaste floor drain surge tank. The staff did not identify any omissions, the component groups are clearly identified, and all component groups reference LRA Section 3.5 for the AMR results.

2.4.9.3 Conclusions

The staff reviewed LRA Section 2.4.9 to determine whether any structural components of the radwaste floor drain surge tank that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the radwaste floor drain surge tank that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the radwaste floor drain surge tank that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.10 Miscellaneous Foundations

2.4.10.1 Summary of Technical Information in the Application

The applicant described the miscellaneous foundations in LRA Section 2.4.10 and provided a list of components subject to an AMR in LRA Table 2.4-10.

The contaminated condensate storage tank foundations provide physical support for the non-safety-related contaminated condensate storage tanks.

The diesel generator fuel oil storage tank foundations provide structural support for the safety-related diesel generator fuel oil storage tanks.

The condensate storage facilities provide a storage volume for clean and potentially contaminated water of suitable quality for use in the reactor and other systems throughout the plant. The Dresden condensate storage facilities ensure that an adequate amount of water is available from each contaminated condensate storage tank for use by HPCI pumps. The Quad Cities condensate storage facilities ensure that an adequate amount of water is available from each contaminated condensate storage tank for use by HPCI, RCIC, and safe shutdown pumps. The contaminated condensate storage tank foundations are Class II reinforced concrete foundations and include anchor bolts.

Each diesel generator fuel oil storage tank, except for the Quad Cities Unit 1 fiberglass tank, is supported on three reinforced concrete foundation pads and anchored with anchor bolts (four per pad). The Quad Cities Unit 1 fiberglass tank is anchored to two reinforced concrete foundations and is restrained in place by stainless steel straps and turnbuckle assemblies.

The applicant identified the following UFSAR references for additional descriptive information about the miscellaneous foundations:

- Dresden Station UFSAR Section(s): 9.2.6, 9.5.4
- Quad Cities Station UFSAR Section(s): 9.2.6, 9.5.4

The applicant defined the following intended functions for the miscellaneous foundations:

Contaminated Condensate Storage Tank Foundations

- Regulated event component support—provides support for components relied upon to demonstrate compliance with fire protection, ATWS, and SBO regulated events.

Diesel Generator Fuel Oil Storage Tank Foundations

- Safety-related component support—provides support for safety-related, seismically qualified fuel oil storage tanks provided for emergency diesel generators.

In LRA Table 2.4-10, the applicant listed the following component groups requiring AMR for the miscellaneous foundations:

Component	Component Intended Function	LRA Aging Management Ref No.
Caulking/Sealants (Dresden)	Shelter, Protection, Shielding	3.5.2.4
Foundations	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26
Foundations	Non-S/R Structural Support	3.5.1.20, 3.5.1.26
Steel Embedments (Quad Cities)	Structural Support	3.5.1.20

The applicant's AMR results for miscellaneous foundations are provided in LRA Section 3.5.

2.4.10.2 Staff Evaluation

The staff reviewed LRA Section 2.4.10, Dresden Station UFSAR Sections 9.2.6 and 9.5.4, and Quad Cities Station UFSAR Sections 9.2.6 and 9.5.4 to determine whether the miscellaneous foundations structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Table 2.4-10 presents the list of structural components applicable to the miscellaneous foundations. The staff did not identify any omissions and all component groups reference LRA Section 3.5 for the AMR results.

However, the applicant's description of the miscellaneous foundations does not explain the component "Caulking/Sealants (Dresden)." It was not clear to the staff what the application would be for foundations. The applicant was requested in RAI 2.4-6 to submit a detailed description of this component and its intended function.

In its response to RAI 2.4-6, the applicant stated the following:

> The Component Group, "Caulking/Sealants (Dresden Only)," is a rubber sealant (type-A) used to seal the Contaminated Condensate Storage Tank between the foundation and tank bottom. The sealant prevents moisture from entering the area between the concrete foundation and the tank bottom, preventing exposure of embedded anchor bolts to moisture.

The additional information provided by the applicant in its RAI response sufficiently answers the question posed by the staff. The staff concludes that the applicant has appropriately addressed this component in its scoping and screening review. RAI 2.4-6 is, therefore, resolved.

2.4.10.3 Conclusions

The staff reviewed LRA Section 2.4.10 to determine whether any structural components of the miscellaneous foundations that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the miscellaneous foundations that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the miscellaneous foundations that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.11 Crib House

2.4.11.1 Summary of Technical Information in the Application

The applicant described the crib house in LRA Section 2.4.11 and provided a list of components subject to an AMR in LRA Table 2.4-11. The crib house serves as the entry point for river water into plant systems. It protects and supports the pumps and pipes which deliver river water to the plant. The crib house is a reinforced concrete structure with a concrete block and steel superstructure. It contains the circulating water, service water and diesel-driven fire pumps.

At Dresden, the crib house includes the diesel generator cooling water pumps and the suction piping for the containment cooling service water system pumps. The diesel generator cooling water pumps and the containment cooling service water system are safety-related. The crib house also contains stop logs that can be used to isolate the compartment and raise its water level where the containment cooling service water system pump and the diesel fire pump take their suction. The crib house is classified as Class II and was investigated to assure that the integrity of the Class I items is not compromised.

At Quad Cities, the crib house includes the suction lines for the RHR service water system. The RHR service water system is safety-related. The crib house is classified as Class II and was investigated to assure that it will not fail and isolate the plant from the river water source. For license renewal evaluation purposes, the Quad Cities discharge flume weir wall that forms one of the boundaries of the ultimate heat sink is included as part of the crib house.

The applicant identified the following UFSAR references for additional descriptive information about the crib house:

- Dresden Station UFSAR Section(s): 1.2.2.2, 3.3.2.3.2, 3.8.5, 9.2.5, and 9.5.5
- Quad Cities Station UFSAR Section(s): 3.3, 3.8.6, and 9.2.5

The applicant defined the following intended functions for the crib house:

- Physical support and protection—provides physical support and protection for safety-related components and components relied upon to demonstrate compliance with the fire protection regulated event.

- Heat sink—provides heat sink during SBO or design-basis events.

- Water source—provides source of cooling water for plant shutdown.

In LRA Table 2.4-11, the applicant listed the following component groups requiring AMR for the crib house:

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete and Grout	Structural Support	3.5.1.29
Concrete and Grout	Non-S/R Structural Support	3.5.1.29
Concrete Canal Weirs (Quad Cities)	Heat Sink	3.5.1.22
Concrete Curbs	Direct Flow	3.5.1.22
Concrete Slabs	Structural Support	3.5.1.22, 3.5.1.26
Concrete Slabs	Shutdown Cooling Water	3.5.1.22
Concrete Slabs	Heat Sink	3.5.1.22, 3.5.1.26
Concrete Stairs	Structural Support	3.5.1.22
Concrete Stairs	Non-S/R Structural Support	3.5.1.22
Concrete Walls	Structural Support	3.5.1.22
Concrete Walls	Non-S/R Structural Support	3.5.1.22
Concrete Walls	Shutdown Cooling Water	3.5.1.22

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete Walls	Heat Sink	3.5.1.22
Fire Doors (Dresden)	Fire Barrier	3.3.1.18
Foundations	Structural Support	3.5.1.22, 3.5.1.26
Foundations	Non-S/R Structural Support	3.5.1.22
Masonry Walls	Structural Support	3.5.1.24
Masonry Walls	Shelter, Protection, Shielding	3.5.1.24
Metal Siding (Dresden)	Shelter, Protection, Shielding	3.5.1.22
Misc. Steel (Dresden)	Non-S/R Structural Support	3.5.1.22
Misc. Steel (Dresden)	Direct Flow	3.5.1.22
Precast Concrete Panels	Structural Support	3.5.1.22
Precast Concrete Panels	Shelter, Protection, Shielding	3.5.1.22
Roofing	Shelter, Protection, Shielding	3.5.2.11
Steel Embedments	Structural Support	3.5.1.20, 3.5.1.22
Steel Embedments (Dresden)	Non-S/R Structural Support	3.5.1.22
Steel Panels and Cabinets	Structural Support	3.5.1.20, 3.5.1.22
Steel Panels and Cabinets (Quad Cities)	Non-S/R Structural Support	3.5.1.20
Steel Plates (Dresden)	Direct Flow	3.5.1.22
Steel Sump Screens (Quad Cities)	Non-S/R Structural Support	3.5.1.22
Structural Steel	Non-S/R Structural Support	3.5.1.22
Walls, Ceilings, Floors	Fire Barrier	3.3.1.28

The applicant's AMR results for the crib house are provided in LRA Sections 3.3 and 3.5.

2.4.11.2 Staff Evaluation

The staff reviewed LRA Section 2.4.11, Dresden Station UFSAR Sections 1.2.2.2, 3.3.2.3.2, 3.8.5, 9.2.5, and 9.5.5, and Quad Cities Station UFSAR Sections 3.3, 3.8.6, and 9.2.5 to determine whether the crib house structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

UFSAR Section 9.2.5 describes the ultimate heat sink for each of the stations. A summary of these descriptions is contained in LRA Section 2.3.3.22, "Ultimate Heat Sink." The staff reviewed this information in depth in order to ensure that all structures and structural components, including earthen embankments, that are necessary to guarantee the ultimate heat sink have been identified to be within the scope of license renewal and subject to an AMR. To complete its review of LRA Section 2.4.11, the staff required a number of clarifications concerning the ultimate heat sink at both stations.

Quad Cities: LRA Section 2.4.11 Crib House states that at Quad Cities, the crib house includes the suction lines for the RHR service water system. It also states that for license renewal purposes, the Quad Cities discharge flume weir wall that forms one of the boundaries of the ultimate heat sink is included as part of the crib house. To complete the review the staff requested the following information:

(a) Clarify why the suction lines for the Quad Cities diesel generator cooling water pumps are not included in the discussion since they are described in LRA Section 2.3.3.22 as taking suction from the crib house.

(b) Explain why the following components related to the Quad Cities crib house are not included in the AMR, or identify the component group in LRA Table 2.4-11 that includes them (for reference, some of the items are identified in Figure 2.4-2 of the Quad Cities UFSAR):

- intake flume/canal (define all boundaries that form the basin)
- log Boom
- crib house wire mesh screens, if applicable
- crib house stop logs, if applicable
- crib house dewatering valves and trash rake refuse pit, if applicable
- discharge structure, including rolling gates
- 16-ft diameter discharge piping
- 96-in ice melting line, including gate
- 14-in circulating water pipe
- discharge flume/canal (define all boundaries that form the basin)
- weir gate in the discharge canal

Dresden: LRA Section 2.4.11 Crib House states that at Dresden, the crib house includes the diesel generator cooling pumps and the suction piping for the containment cooling service water system pumps. It also states that the crib house contains stop logs that can be used to isolate the compartment and raise its water level where the containment cooling service water system pump and the diesel fire pump take their suction. To complete the review the staff requested the following information in RAI 2.4-7:

(a) Confirm that for Dresden the cooling lake and associated "hot" and "cold" canals, described in Dresden Station UFSAR Section 2.4, are not part of the ultimate heat sink and do not serve an intended function for license renewal. If they do, submit the AMR, including the credited AMP(s).

(b) Explain why the following components related to the Dresden crib house are not included in the AMR, or identify the component group in LRA Table 2.4-11 that includes them (for reference, some of the items are identified in Figure 2.4-1 of the Dresden UFSAR):

- intake flume/canal (define all boundaries that form the basin)
- floating boom protecting intake canal
- crib house wire mesh screens
- crib house stop logs
- crib house dewatering valves and trash rake refuse pit
- discharge outfall structure, including rolling gates
- 14.0-ft diameter circulating water pipe from power plant
- 8.0-ft diameter ice melt recirculating pipe, including ice melt gate (or deicing valve)
- circulating water pipe, similar to 14-in circulating water pipe shown on Figure 2.4-2 of the Quad Cities UFSAR, if applicable
- discharge flume/canal (define all boundaries that form the basin)
- flow-regulating station

In its response to RAI 2.4-7, the applicant stated the following:

> Quad Cities
>
> (a) The suction lines in the Quad Cities Crib House are associated with RHR service water system. The Diesel Generator Cooling Water Pumps take suction off of the RHR service water line (see boundary diagrams LR-QDC-M-37, location E-3 and E-8 and LR-QDC-M-79, location F-4.) These branch connections are physically located in the Turbine Building, in the RHR service water pump vaults. The difference between LRA Sections 2.4.11 and 2.3.3.22 is that LRA Section 2.4.11 discusses the equipment contained in the structure and LRA Section 2.3.3.22 discusses the functions served by maintaining the UHS.
>
> (b) The following provides the additional requested information for each of the Quad Cities components listed above:
>
> - Intake flume/canal (define all boundaries that form the basin)—The intake flume boundaries include the topographic basin from the high point (at approximately 565' elevation) on the river bottom between the crib house and the main river channel on the west side and extending to the crib house on the east side. This basin is rock and earthen bottom. LRA Table 2.4-11, Component Group Concrete Walls, addresses the crib house walls.
> - Log Boom—The log boom is a floating structure that functions as a barrier to floating debris during normal operations. However, it does not perform any function to retain

water in the event of a loss of lock and dam 14 (the design basis event bringing the UHS in scope). Therefore, the log boom does not fall within the scope of License Renewal and does not require aging management.

- Crib House wire mesh screens (if applicable)—Quad Cites has Wire Mesh Screens filtering the RHR Service Water intake. These wire mesh screens do not perform a function in maintaining the UHS and therefore are not in the scope of License Renewal and do not require aging management.
- Crib House stop logs (if applicable)—The stop logs are installed to perform maintenance in crib house bays (intake and discharge bays). At Quad Cities, they do not perform any function relative to maintaining the UHS. As such, they are not in the scope of License Renewal and do not require aging management.

- Crib house dewatering valves and trash rake refuse pit, (if applicable)—The dewatering valves are used to drain circulating water piping and bays. Station procedures require the unit to be in cold shut down prior to draining these areas; therefore, the UHS would not be required. Additionally, these valves are not required to perform pressure boundary functions for the UHS. As such, the dewatering valves are not in the scope of License Renewal and do not require aging management. Quad Cities does not have a Trash Rake Refuse Pit.

- Discharge structure, including rolling gates—At Quad Cities, the discharge structure shown on UFSAR Figure 2.4-2 is attached to and managed as part of the crib house. The crib house walls are addressed in LRA Table 2.4-11 under Component Group—Concrete Walls. The rolling gates shown on this same figure are installed for maintenance of the circulating water system only. They are open during normal operations and are not required to support any UHS function. Therefore, they are not within the scope of License Renewal and do not require aging management.

- 16-ft diameter discharge piping—This component falls within the scope of license renewal and is evaluated in LRA Table 2.3.3-22 under Component Group—Piping and Fittings.

- 96" Ice Melting Line, including gate—The Ice Melting Line falls within the scope of License Renewal and is evaluated in LRA Table 2.3.3-22 under Component Group—Piping and Fittings. The gate is the Ice Melt Valve which also falls within the scope of License Renewal and is evaluated in LRA Table 2.3.3-22 under Component Group—Valves. Note that LRA Table 2.3.3-22, Component—Group Valves, should have been revised to delete "(Dresden Only)" as shown below.

- 14" Circulating Water Pipe—The 14" Circulating Water Pipe shown on UFSAR Figure 2.4-2 is the service water return line from the RHR Service Water system and the Diesel Generator Cooling Water system. This non-safety-related piping, located outside of the turbine building, is not required to support any intended function and does not fall within the scope of License Renewal. As such, it does not require aging management.

- Discharge flume/canal (define all boundaries that form the basin)—The discharge flume falls within the scope of license renewal. Those portions within the scope of License Renewal begin at the crib house (LRA Table 2.4-11, Component Group—Concrete Walls) and extend to the discharge canal weir (LRA Table 2.4-11, Component Group—Concrete Canal Weirs).

- Weir gate in the discharge canal—The weir gate falls within the scope of License Renewal and is evaluated in LRA Table 2.4-11 under Component Group —Concrete Canal Weirs.

Dresden

(a) Dresden cooling lake and the associated hot and cold canals are not credited with water supply in the event that the normal heat sink (the river) is unavailable. Therefore, the cooling lake and the associated hot and cold canals do not require aging management.

(b) The following provides additional requested information for each of the Dresden components listed above:

- Intake flume/canal (define all boundaries that form the basin)—The intake canal falls within the scope of license renewal. The intake flume starts at the Kankakee River intake canal interface with the canal bottom high point at elevation 495'-0" and runs to the crib house. LRA Table 2.3.3-22 should have added "Earthen Structures" to address the canal, as shown below. LRA Table 2.4-11, Component Groups—Concrete Slabs and Concrete Walls, addresses the crib house.

- Floating Boom protecting intake canal—The floating boom is a floating structure that functions as a barrier to floating debris during normal operations. However, it does not perform any function in retaining water in the event that the normal heat sink (the river) is unavailable. Therefore, the log boom does not fall within the scope of License Renewal and does not require aging management.

- Crib House wire mesh screens—In the event that the normal heat sink becomes unavailable, the Crib House Wire Mesh Screens are removed to allow the installation of the stop logs. These screens therefore provide no function in maintaining the UHS and are not in the scope of License Renewal and do not require aging management.

- Crib House stop logs—The stop logs are needed to support the UHS should have been added to LRA Tables 2.3.3-22 and 3.3-2 as shown below.

- Crib house dewatering valves and trash rake refuse pit—LRA Table 2.3.3-22, Component Group Valves, addresses the dewatering valves. The trash rake refuse pit is part of the crib house structure. LRA Table 2.4-11, Component Groups Concrete Slabs and Concrete Walls, address the crib house.

- Discharge Outfall Structure, including rolling gates—Portions of the Outfall Structure fall within the scope of the Rule and perform a structural pressure barrier function for the UHS. The Outfall Structure should have been added to LRA Table 2.3.3-22, under Component Group—Concrete Slabs and Concrete Walls, as shown below. The rolling gates are available for performing maintenance on the Discharge Outfall Structure bays, are normally open, and are not required to perform any function associated with the UHS. As such they are not within the scope of License Renewal and do not require aging management.

- 14.0-ft Diameter Circulating Water Pipe from Power Plant—The circulating water pumps are secured in the event that the normal heat sink (the river) is unavailable. Therefore this piping is not relied upon for the UHS and does not require aging management.

- 8.0-ft Diameter Ice Melt Recirculating Pipe, including ice melt gate (or deicing valve)—LRA Table 2.3.3-22, Component Group Piping and Fittings

- Circulating water pipe, similar to 14" circulating water pipe shown on Figure 2.4-2 of the QC UFSAR (if applicable)—This piping is not applicable to Dresden. At Quad Cities the Circulating Water discharges at the crib house, at Dresden it discharges at the Discharge Structure.

- Discharge flume/canal (define all boundaries that form the basin)—The discharge canal falls within the scope of License Renewal. The discharge flume starts at the Discharge Outfall Structure and runs to the discharge canal interface with the Illinois River at

Elevation 498'-0". LRA Table 2.3.3-22 should have added "Earthen Structures" to address the canal. "Concrete Walls" and "Concrete Slabs" should have also been added to LRA Table 2.3.3-22 to address the Discharge Outfall Structure, as shown below.

Flow-regulating station—Failure of the flow-regulating station would not affect plant safety or the ability to accomplish safe shutdown in either configuration (open or closed cycle). Therefore, the flow-regulating station was considered out of scope and does not require aging management.

Note: Systems do not usually contain structures. Structures usually line up with structures between Chapter 2 and Chapter 3, but there are some exceptions. In this unusual circumstance where the ultimate heat sink system does contain structural components, the aging management reference provided in the system portion of Chapter 2 is to the structural portion of Chapter 3 of the LRA, when applicable.

Table 2.3.3-22 Component Groups Requiring Aging Management Review—Ultimate Heat Sink

Component	**Component Intended Function**	**Aging Management Ref No.**
Concrete Slabs (Dresden only)	Structural Pressure Barrier	3.5.1.22
Concrete Walls (Dresden only)	Structural Pressure Barrier	3.5.1.22
Earthen Structures (Dresden only)	Structural Pressure Barrier	3.5.1.22
Stop Logs (Dresden only)	Structural Pressure Barrier	3.3.2.304
Valves	Pressure Boundary	3.3.2.278, 3.3.2.300

The information provided by the applicant in its RAI response and additional clarification provided in a submittal, dated December 5, 2003, sufficiently answers the questions posed by the staff. RAI 2.4-7 is, therefore, resolved.

2.4.11.3 Conclusions

The staff reviewed LRA Section 2.4.11 to determine whether any structural components of the crib house that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the crib house that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the crib house that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.12 Unit 1 Crib House (Dresden)

2.4.12.1 Summary of Technical Information in the Application

The applicant described the Dresden Unit 1 crib house in LRA Section 2.4.12 and provided a list of components subject to an AMR in LRA Table 2.4-12.

The Unit 1 crib house at Dresden supports a diesel-driven fire pump, which is required to support the Unit 2 and 3 fire protection system.

The diesel-driven fire pump assembly is located on a reinforced concrete floor slab and takes its suction from the center bay of the Unit 1 crib house. The diesel engine is supported by a reinforced concrete pedestal and anchored by cast-in-place anchor bolts. The fire pump support consists of a steel leveling/bearing plate, on grout, with cast-in-place anchor bolts. The anchor bolts and the steel leveling bearing plate are evaluated in the component support commodity group.

The applicant identified the following UFSAR references for additional descriptive information about the Dresden Unit 1 crib house:

- Dresden Station UFSAR Section(s): 9.2.2
- Quad Cities Station UFSAR Section(s): Not Applicable

The applicant defined the following intended function for the Dresden Unit 1 crib house:

- Credited in regulated events—provides physical support for components relied upon to demonstrate compliance with the fire protection regulated events.

In LRA Table 2.4-12, the applicant listed the following component groups requiring AMR for the Dresden Unit 1 crib house:

Component	Component Intended Function	LRA Aging Management Ref No.
Concrete and Grout (Dresden)	Non-S/R Structural Support	3.5.1.29
Concrete Slabs (Dresden)	Structural Support	3.5.1.22
Concrete Slabs (Dresden)	Non-S/R Structural Support	3.5.1.22
Walls, Ceilings, Floors (Dresden)	Fire Barrier	3.3.1.28

The applicant's AMR results for the Unit 1 crib house are provided in LRA Sections 3.3 and 3.5.

2.4.12.2 Staff Evaluation

The staff reviewed LRA Section 2.4.12 and Dresden Station UFSAR Section 9.2.2 to determine whether the Dresden Unit 1 crib house structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

Based on the information provided in LRA Section 2.4.12, it was not clear to the staff that "fire barrier" is the only intended function for the walls and ceilings of the Dresden Unit 1 crib house. The applicant was requested in RAI 2.4-8 to submit the following information:

(a) How would collapse of the building walls and ceiling effect the availability of the diesel-driven fire pump?

(b) Are the walls and ceiling inspected as part of Maintenance Rule structures monitoring, and is this program credited to manage aging of the walls and ceiling for license renewal?

In its response to RAI 2.4-8, the applicant stated the following:

> Exelon has reviewed LRA Section 2.4.12 and provides the following clarifications:
>
> (a) While the Unit 1 Crib House walls and ceiling have been evaluated as fire barriers, they were not evaluated for the secondary effect they could have on the diesel-driven fire pump if they were to collapse. Such an evaluation would be performed if the structure contained safety-related components. However, the Unit 1 Crib House is not a safety-related structure and there are no safety-related components contained within the building. Since the walls and ceiling do not perform a safety-related function and there are no safety-related components that can be affected by the collapse of the walls or ceiling, the criteria stated in 10 CFR 54.4(a)(2) are not applicable to this situation. For these reasons, structural support is not an intended function of the walls and ceiling. This position is supported by NUREG-1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants. Table 2.1-2 of NUREG-1800 states:
>
> > An applicant need not consider hypothetical failures or second, third, or fourth level support systems. For example, if a non-safety-related diesel generator is only relied upon to remain functional to demonstrate compliance with the NRC's SBO regulations, an applicant may not need to consider (1) an alternate/backup cooling water system, (2) the diesel generator non-seismically qualified building walls, or (3) an overhead segment of non-seismically qualified piping (in a Seismic II/I configuration).
>
> The Unit 1 Crib House is not "explicitly credited" in the Dresden current licensing basis documents for Fire Protection. In addition, the Unit 1 diesel-driven fire pump provides a backup supply of river water to the fire protection system. It is not the primary system credited for maintaining fire protection system pressure.
>
> (b) The Unit 1 Crib House structure is included within the scope of the Maintenance Rule Structural Monitoring program. While the walls and ceiling are inspected per the Structural Monitoring Program criteria, this activity is not credited for License Renewal for the reasons stated in (a) above.

The additional information provided by the applicant in its RAI response sufficiently answers the two questions posed by the staff. The staff concludes that the applicant has appropriately addressed the Dresden Unit 1 crib house in its scoping and screening review. Therefore RAI 2.4-8 is resolved.

2.4.12.3 Conclusions

The staff reviewed LRA Section 2.4.12 to determine whether any structural components of the Dresden Unit 1 crib house that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the Dresden Unit 1 crib house that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the Dresden Unit 1 crib house that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.13 Station Chimney

2.4.13.1 Summary of Technical Information in the Application

The applicant described the station chimney in LRA Section 2.4.13 and provided a list of components subject to an AMR in LRA Table 2.4-13. The station chimney provides an elevated discharge point for treated gaseous radioactive effluents. The chimney is a 310-ft tall tapered structure that contains and/or directs the release of fission products. The reinforced concrete chimney is founded on bedrock. The lower section of the chimney is divided into five cells consisting of reinforced concrete walls that provide a holdup volume for the gland exhausters.

The applicant identified the following UFSAR references for additional descriptive information about the station chimney:

- Dresden Station UFSAR Section(s): 11.3
- Quad Cities Station UFSAR Section(s): 11.3

The applicant defined the following intended functions for the station chimney:

- Elevated release—provides for the discharge of treated gaseous waste to meet the requirements of 10 CFR Part 100.

- Pressure control path—provides a secondary pressure control path for primary containment.

In LRA Table 2.4-13, the applicant listed the following component groups requiring AMR for the station chimney:

Component	Component Intended Function	LRA Aging Management Ref No.
Caulking/Sealants	Gaseous Release Path	3.5.2.4
Concrete Slabs	Structural Support	3.5.1.20
Concrete Walls	Structural Support	3.5.1.20
Concrete Walls	Gaseous Release Path	3.5.1.20
Foundations	Structural Support	3.5.1.20, 3.5.1.21, 3.5.1.25, 3.5.1.26
Masonry Walls (Quad Cities)	Structural Pressure Barrier	3.5.2.9
Masonry Walls (Quad Cities)	Gaseous Release Path	3.5.2.9
Misc. Steel (Includes Platforms, Ladders, Railings)	Non-S/R Structural Support	3.5.1.20
Steel Doors (Dresden)	Gaseous Release Path	3.5.1.20
Steel Embedments	Structural Support	3.5.1.20
Steel Plates	Gaseous Release Path	3.5.1.20
Structural Steel	Non-S/R Structural Support	3.5.1.20

The applicant's AMR results for the station chimney are provided in LRA Section 3.5.

2.4.13.2 Staff Evaluation

The staff reviewed LRA Section 2.4.13, Dresden Station UFSAR Section 11.3, and Quad Cities Station UFSAR Section 11.3 to determine whether the station chimney structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

LRA Table 2.4-13 presents a comprehensive list of structural components for the station chimney. The staff did not identify any omissions made by the applicant.

2.4.13.3 Conclusions

The staff reviewed LRA Section 2.4.13 to determine whether any structural components of the station chimney that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the station chimney that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the station chimney that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.14 Cranes and Hoists

2.4.14.1 Summary of Technical Information in the Application

The applicant described the cranes and hoists in LRA Section 2.4.14 and provided a list of components subject to an AMR in LRA Table 2.4-14. Cranes and hoists provide systems for lifting, transporting, and handling of loads. Cranes and hoists include those cranes and hoists whose failure could affect safety-related components, except for the refueling bridge platform, which is covered with refueling equipment. Cranes and hoists include the reactor building crane, the turbine building cranes, smaller capacity cranes and hoists, and jib cranes that are located in various parts of the reactor and turbine buildings. Cranes and hoists and jib cranes are classified as Safety Class II components.

The reactor building crane services the operating floor, which is shared by both units. It is a bridge-type crane equipped with a 125-ton main hoist and a 9-ton auxiliary hoist and can reach major component storage areas on the operating floor. The reactor building crane is used for lifting and transporting the spent fuel cask between the spent fuel pools and the cask decontamination work area, and handling other equipment and reactor components accessible from the refueling floor. The crane hoist system consists of a dual load path through the hoist gear train, the reeving system, and the hoist load block along with restraints at critical points to provide load retention and minimization of uncontrolled motions of the load in the event of failure of any single hoist component. Redundancy has also been designed into the hoist, trolley brakes, the spent fuel cask lifting devices, and crane control components.

The two turbine building overhead cranes are equipped with a 175-ton hoist, with a 25-ton auxiliary hoist (for the south crane at Quad Cities and the west crane at Dresden), and a 125-ton hoist with a 10-ton auxiliary hoist (for the north crane at Quad Cities and the east crane at Dresden).

The applicant identified the following UFSAR references for additional descriptive information about the cranes and hoists:

- Dresden Station UFSAR Section(s): 9.1.4
- Quad Cities Station UFSAR Section(s): 9.1.4

The applicant defined the following intended function for the cranes and hoists:

- Lifting and transporting loads—provide a safe means for handling safety-related components and loads above or near safety-related components.

In LRA Table 2.4-14, the applicant listed the following component groups requiring AMR for the cranes and hoists:

Component	Component Intended Function	LRA Aging Management Ref No.
Cranes	Structural Support	3.3.1.3

Component	Component Intended Function	LRA Aging Management Ref No.
Cranes	Non-S/R Structural Support	3.3.1.14
Rails	Non-S/R Structural Support	3.3.1.14

The applicant's AMR results for cranes and hoists are provided in LRA Section 3.3.

2.4.14.2 Staff Evaluation

The staff reviewed LRA Section 2.4.14, Dresden Station UFSAR Section 9.1.4, and Quad Cities Station UFSAR Section 9.1.4 to determine whether the cranes and hoists structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

Based on information provided in LRA Section 2.4.14, the staff cannot identify which "LRA Aging Management Ref No" is applicable to each of the crane/rail systems included in the scope of LRA 2.4.14. Also, it is unclear to the staff why cranes and hoists have been split into two groups, covered under different sections of LRA Section 2.0, and why all references to aging management results point to LRA Section 3.3, Auxiliary Systems.

The applicant was requested in RAI 2.4-9 to clarify the treatment of cranes and hoists in the scoping and screening, and in the AMR. In addition, the applicant was requested to submit the following information:

(a) a list of all cranes/hoists/rails and associated components in the scope of license renewal

(b) a list of all cranes/hoists/rails and associated components excluded from the license renewal scope, and the technical bases for their exclusion

(c) a list of all cranes/hoists/rails and associated components requiring an AMR (i.e., passive, long-lived)

(d) a list of all cranes/hoists/rails and associated components requiring aging management and/or TLAA, and the specific AMP(s) and TLAAs credited to manage aging

In its response to RAI 2.4-9, the applicant stated the following:

> With the exception of cranes and hoists associated with the refueling system, most cranes are integral parts of structures for which they provide service. For this reason, Exelon separated overhead lifting systems into two separate groups. Those cranes and hoists associated with the refueling system are evaluated in LRA Section 2.3.3.1, Refueling Equipment. All other cranes and hoists were evaluated

in LRA Section 2.4.14, Cranes and Hoists. Only overhead lifting systems associated with refuel handling are evaluated in NUREG-1801 (Section VII.B.1-a). Components from this section of the NUREG are evaluated for aging management under Auxiliary Systems (see Table 3 in NUREG-1801 Volume 1). In order to maintain consistency with NUREG-1801, Exelon decided to evaluate the aging for all overhead lifting systems (refueling and non-refueling) in LRA Section 3.3, Aging Management of Auxiliary System.

(a) Crane subsystems are installed throughout various buildings at Dresden and Quad Cities. A list of crane subsystems included within the scope of License Renewal is provided below for each site. Each crane subsystem includes rails, structural girders required for support of the crane loads, and the crane mechanism. The crane mechanism includes drive tires/wheels, bolts, nuts, rivets, load blocks, suspension housing, hand chain wheels, chain attachments, clevis, yokes, suspension bolts, shafts, gears, bearings, pins, rollers, locks and clamping devices, hook retaining nuts, hook retaining collars/pins, retaining member welds, load sprockets, drums, sheaves, mechanical brake mechanisms, and hooks.

In addition to crane subsystems, a number of monorail tracks have been installed over various locations throughout each site to facilitate maintenance. Portable hoists are installed on these monorails when maintenance is required or equipment requires movement. Those instances below for which the description does not include a crane or hoist only refer to monorails.

Dresden Reactor Building—In Scope

Unit 2 Reactor Building (613Æ Elevation) Hatch Jib Crane
Unit 3 Reactor Building (613Æ Elevation) Hatch Jib Crane
Reactor Building (Elevation 613Æ) New Fuel Storage Vault Jib Crane
Reactor Service Platform Jib Crane
Unit 2 Reactor Building (545Æ Elevation) Hatch Jib Crane
Reactor Building Overhead Crane

Dresden Turbine Building—In Scope

Unit 3 Diesel Generator Room Monorails (2)
Diesel Generator Room Monorail Crane
Unit 2 Turbine Building Overhead Crane
Unit 2 Diesel Generator Room Monorails (2)
Unit 3 Turbine Building Overhead Crane

Dresden Primary Containment—In Scope

Unit 2 Drywell Equipment Hatch Monorails
Unit 2 Drywell CRD Pit Jib Monorails
Unit 2 Drywell Ground Floor Continuous Monorails
Unit 2 Drywell 2nd Floor Jib Monorails
Unit 3 Drywell Equipment Hatch Monorails
Unit 3 Drywell CRD Pit Jib Monorails
Unit 3 Drywell Ground Floor Continuous Monorails
Unit 3 Drywell 2nd Floor Jibs Monorails

Dresden Miscellaneous Buildings—In Scope

2/3 Diesel Generator Room Monorails (3)
Unit 2 HPCI Room Trolley Chain Hoist
Unit 3 HPCI Room Trolley Chain Hoist
2/3 Cribhouse Service Water Pump Electric Hoist (a single monorail that is used to move and position the stop logs for set up of the ultimate heat sink)

Circ water pump monorails and trolleys (4) (these non-safety-related monorails pass over the safety-related Unit 2 and Unit 3 diesel generator cooling water pumps)

Quad Cities Reactor Building—In Scope

Unit 1 CRD Repair Floor Jib

Unit 2 CRD Repair Floor Jib

New Fuel Inspection Stand Jib

Unit 1 and 2 Reactor Service Platform Jib

Unit 1 and 2 Reactor Building Overhead Crane

Unit 1 Reactor Building (Elevation 666/Æ) Jib crane (does not exist on Unit 2)

Quad Cities Turbine Building—In Scope

Unit 1 Turbine Building Overhead Crane

Unit 2 Turbine Building Overhead Crane

Unit 1 Emergency Diesel Generator Room Monorails

Unit 2 Emergency Diesel Generator Room Monorails

Unit 1 HPCI Monorail Hoist

Unit 2 HPCI Monorail Hoist

RHR Service Water Pump Monorails (8)

Quad Cities Primary Containment—In Scope

Unit 1 Drywell First Level Monorail

Unit 2 Drywell First Level Monorail

Unit 1 Drywell 2nd Floor Jibs for SRV work

Unit 2 Drywell 2nd Floor Jibs for SRV work

Quad Cities Miscellaneous Buildings—In Scope

Unit ½ (Common) Emergency Diesel Generator Room Monorails

(b) The following list contains all cranes, hoists, and rails at each site that have been excluded from the scope of License Renewal. The list only applies to cranes, hoists and rails that are located within structures that have been included within the scope of License Renewal. Cranes, hoists, and monorails physically located in structures that are not within the scope of License Renewal are not listed below. Out-of-scope structures do not include safety-related equipment. As such, any crane, hoist or monorail located within the structure could not affect safety-related equipment. For this reason they were excluded from the scope of License Renewal along with the associated structure. The cranes, hoists, or monorails listed below are not safety-related, are not required for any safety-related system to perform any intended function, and are not capable of moving any load over or spatially interact with safety-related equipment. For these reasons, they were excluded from the scope of License Renewal.

Dresden Reactor Building—Out of Scope

Unit 2 Reactor Building (517/Æ Elevation) Material Interlock Underhung Jib Crane

Unit 3 Reactor Building (517/Æ Elevation) Material Interlock Underhung Jib Crane

Unit 2 Reactor Building (589/Æ Elevation-RWCU Filter Demon. blocks) Monorails (1)

Unit 3 Reactor Building (589/Æ Elevation-RWCU Filter Demon. blocks) Monorails (1)

Unit 2 Reactor Building (545/Æ Elevation - north of RBCCW HX) Monorails (1)

Unit 3 Reactor Building (570 Elevation - north of main hatch) Monorails (1)

Unit 3 Reactor Building (517/Æ Elevation - East & West) Monorails (2)

Dresden Turbine Building—Out of Scope

- Control Rod Drive Overhaul Shop Crane Underhung
- Control Rod Drive Overhaul Shop Jib Crane
- Unit 2 Turbine Building Trackway (Elevation 538/Æ) Elevator Air Hoist Crane Monorail
- Unit 3 Turbine Building Trackway (Elevation 538/Æ) Elevator Air Hoist Crane Monorail
- Control Rod Drive Flush Tank Jib Crane
- Unit 3 Safety Valve Test Boiler Jib Crane
- Unit 3 Safety Valve Test Boiler Crane Monorail
- Unit 2 Turbine Building Trackway Rollup Door Hoist Mechanism
- Unit 3 Turbine Building Trackway Rollup Door Hoist Mechanism
- All condensate / booster pump monorails (16)
- All control rod drive hydraulic pump monorails (4)
- Reactor Recirculation Motor Generator Set Monorails (4)
- All stator cooling water heat exchanger monorails (2)
- Reactor feedwater pump monorails (2)
- Instrument air compressor monorails (3)
- Feedwater regulating valve station monorails (5)
- Turbine Building floor / equipment drain sump pump monorails & jib
- Turbine Building freight elevator monorail (549æ elevation)
- Main Condenser pull/pit monorail (1)
- Low pressure heater monorails (12)
- Low pressure heater bay area monorails (4)
- South Turbine Building 2/3 MG Sets Rollomatic Filters Underhung Crane

Dresden Miscellaneous Buildings—Out of Scope

- 2/3 Cribhouse Refuse Basket Underhung Crane
- Station Blackout Building monorails (4)
- Service water pump monorails and trolleys (5)
- Service water strainer monorail and trolley (1)
- 2/3 Cribhouse East/West Monorail Electric Hoist/Trolley

Quad Cities Reactor Building—Out of Scope

- Unit 1 Reactor Building (Elevation 666/Æ) Monorail Hoist
- Unit 2 Reactor Building (Elevation 666/Æ) Monorail Hoist
- CRD Repair Area Monorail Hoist
- CRD Repair Room Monorail

Quad Cities Turbine Building—Out of Scope

- Unit 1 Condensate Pit Jib
- Unit 2 Condensate Pit Jib
- Unit 1 Condensate Demineralizer Monorail
- Unit 2 Condensate Demineralizer Monorail
- Unit 1 Turbine Building Trackway Crane
- Unit 2 Turbine Building Trackway Crane
- Radwaste Truck Bay Crane
- Max Recycle Crane
- Radwaste Basement Jib
- Radwaste Shield Door Hoists (#94-#96)

"C" Warehouse Overhead Cranes (East & West)
Unit 1 CRD pump Monorail
Unit 2 CRD pump Monorail
Reactor Recirc MG Set Monorails (4)
Instrument Air Compressor Monorails (2)
Unit 1 Battery Room Area Monorail
Unit 2 Battery Room Area Monorail
Unit 2 Reactor Feed Pump Vent Fan area Monorail (does not exist on Unit 1)
Generator Lifting Beam (on Turbine Deck)
10 Ton Lifting Beam with Hoist (on Turbine Deck)
Trolley Monorail (on Turbine Deck)
Unit 1 Off Gas Filter Room Area Monorail
Unit 2 Off Gas Filter Room Area Monorail
Unit 1 TBCCW Heat Exchanger Area Trolley with Underhung Hoist
Unit 1 Outside the West end of the Heater Bay Ground Floor Monorail (2)
Unit 2 TBCCW Heat Exchanger Area Monorail Trolley with Underhung Hoist
Unit 1 (Elevation 595Æ) Outside the West end of the Heater Bay Ground Floor Monorail (2)
Unit 2 (Elevation 595Æ) Outside the West end of the Heater Bay Ground Floor Monorail (2)
Unit 1 (Elevation 611Æ) Outside the West end of the Heater Bay Second Floor Monorail (7)
Unit 2 (Elevation 611Æ) Outside the West end of the Heater Bay Second Floor Monorail (7)
Unit 1 Reactor Feed Pump Exhaust Fan Area Monorail (does not exist on Unit 2)
Unit 1 (Elevation 668Æ) Floor Elevation Monorail
Unit 2 (Elevation 648Æ) Floor Elevation Monorail

Quad Cities Miscellaneous Buildings—Out of Scope
Unit 1 Station Blackout Diesel Room Monorail
Unit 2 Station Blackout Diesel Room Monorail
Crib House Monorail for circulating water pumps
Fish Basket Jib
Trash Rake Crane

(c) All cranes, hoists, and monorails within the scope of License Renewal require aging management review are listed in the response to (a) above. While the type of components comprising crane subsystems can vary, the following cranes component types require aging management:

a. Load carrying flanges
b. Support structures
c. Bolts, nuts, or rivets
d. Load blocks
e. Suspension housings
f. Hand chain wheels
g. Chain attachments
h. Clevis
I. Yokes
j. Suspension Bolts
k. Shafts

l. Gears
m. Bearings
n. Pins
o. Rollers
p. Lock and Clamping Devices
q. Hook Retaining Nuts
r. Hook Retaining Collars/Pins
s. Retaining Member Welds
t. Load Sprockets
u. Drums
v. Sheaves
w. Hydraulic Subsystems
x. Cable
y. Cable Clamps
z. Brakes
aa. Bridge/Beam Structures

(d) All cranes, hoists, and monorails within the scope of License Renewal (listed in the response to (a) above) require aging management review. Aging for these cranes, hoists, and monorails will be managed under Aging Management Program B.1.15, Overhead Heavy Load and Light Load Handling Systems. The reactor building overhead cranes at Dresden and Quad Cities were designed to meet or exceed the design fatigue loading requirements of the Crane Manufacturers Association of America (CMAA) Specification 70, Class A1. The evaluation of expected cycles over the life of each plant is the basis of a safety determination and is therefore a TLAA. Section 4.7.1, Reactor Building Crane Load Cycles, provides the disposition for this TLAA.

The additional information provided by the applicant in its RAI response is comprehensive and sufficiently answers all four questions posed by the staff. The staff concludes that the applicant has appropriately addressed cranes and hoists in its scoping and screening review. Therefore RAI 2.4-9 is resolved.

2.4.14.3 Conclusions

The staff reviewed LRA Section 2.4.14 to determine whether any structural components of the cranes and hoists that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the cranes and hoists that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the cranes and hoists that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.15 Component Supports Commodity Group

2.4.15.1 Summary of Technical Information in the Application

The applicant described the component supports commodity group in LRA Section 2.4.15 and provided a list of components subject to an AMR in LRA Table 2.4-15.

The component support commodity group consists of support members (includes support members, welds, bolted connections, and support anchorage to building structures), high strength bolting for Class I supports, and miscellaneous supports (includes constant and variable load springs, guides, stops, sliding surfaces, design clearances, vibration isolators, and clevis pins).

The applicant stated that grout (which includes reinforced concrete, grout, and masonry) is evaluated as a component group within structures.

The component supports commodity group includes the following:

- supports for ASME Class I, 2, and 3 piping and components
- supports for ASME Class MC components, including suppression chamber seismic restraints, suppression chamber support saddles and columns, and vent system supports
- supports for cable trays, conduit, HVAC ducts, tube track, instrument tubing and non-ASME piping and components
- anchorage of racks, panels, cabinets, and enclosures for electrical equipment and instrumentation
- supports for emergency diesel generator, HVAC system components, and miscellaneous mechanical equipment
- supports for platforms, pipe whip restraints, jet impingement shields, masonry walls, and miscellaneous structures

In LRA Table 2.4-15, the applicant listed the following component groups requiring AMR for the component supports commodity group:

Component	Component Intended Function	LRA Aging Management Ref No.
Anchorage to Buildings, Including Bolted/Welded Connections	Structural Support	3.5.1.29, 3.5.1.30
Anchorage to Buildings, Including Bolted/Welded Connections	Non-S/R Structural Support	3.5.1.29
Bolting	Structural Support	3.5.1.32
Clevis Pins: Suppression Chamber Columns, Vent	Structural Support	3.5.2.5
Instrument Racks, Frames, Panels, etc.	Structural Support	3.5.1.29
Instrument Racks, Frames, Panels, etc.	Non-S/R Structural Support	3.5.1.29
Raceways	Structural Support	3.5.1.29

Component	Component Intended Function	LRA Aging Management Ref No.
Sliding Surfaces	Structural Support	3.5.1.31
Support Members (includes Spring Hangers)	Structural Support	3.2.2.79, 3.2.2.80, 3.2.2.81, 3.5.1.29, 3.5.1.31, 3.5.2.14
Support Members	Non-S/R Structural Support	3.5.1.29
Vibration Isolation Elements (Quad Cities)	Structural Support	3.5.1.29

The applicant's AMR results for component supports are provided in LRA Sections 3.2 and 3.5.

2.4.15.2 Staff Evaluation

The staff reviewed LRA Section 2.4.15 to determine whether the component supports commodity group structural components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR, to determine if any components were omitted.

Based on information provided in LRA Section 2.4.15, it is not clear to the staff that all component supports within the scope of license renewal are included in the component supports commodity group. Also, clarification is needed for several "Components" listed in Table 2.4-15.

In order to complete the screening review for component supports, the staff requested in RAI 2.4-10 the applicant to submit the following information:

(a) Clarify if the ASME Class 1 supports in this commodity group include the reactor vessel support skirt/support ring and reactor vessel upper lateral stabilizer support. If not, where are these supports addressed in the LRA? If not managed by ASME Section XI, Subsection IWF, submit the technical basis for crediting an alternate AMP.

(b) Clarify if the ASME Class MC supports in this commodity group include the drywell lower ring support and the drywell upper lateral support. If not managed by ASME Section XI, Subsection IWF, submit the AMR for the drywell supports, including the technical basis for this exception.

(c) Since LRA Section 2.4.15 is not referenced anywhere in LRA Sections 2.3 or 2.4, verify that all supports associated with "Components" listed in LRA Sections 2.3 and 2.4.1 through 2.4.14 are included in the component supports commodity group. If not, identify the supports not included and submit the AMR, including credited AMPs.

(d) Verify that the "Anchorage to Buildings Including Bolted/Welded Connections" component in

LRA Table 2.4-15 includes anchors directly into concrete.

In its response to RAI 2.4-10, the applicant stated the following:

(a) The ASME Class 1 supports discussed in Section 2.4-15 of the LRA do not include the reactor vessel support skirt. The reactor vessel support skirt was evaluated in LRA Section 2.3.1.1, "Reactor Vessel." The reactor vessel support skirt was included in LRA Table 2.3.1-1 under the Component Group "Support Skirts and Attachment Welds." This is in alignment with NUREG-1801, which assigns "Support Skirt and Attachment Welds" to Section IV.A1, "Reactor Vessel (Boiling Water Reactor)." The aging management of the support skirts and attachment welds has been analyzed as a TLAA and is discussed in LRA Section 4.3.1, Reactor Vessel Fatigue Analysis. Specifically, the reactor vessel support skirt will be managed for fatigue under aging management program, B.1.34, Metal Fatigue of the Reactor Coolant Pressure Boundary.

The reactor vessel support ring girder and upper lateral stabilizer supports were analyzed in LRA Section 2.4.15, "Component Supports Commodity Group" as part of the "Support Members (Includes Spring Hangers)" Component Group. The upper lateral stabilizer supports are managed by Aging Management Program B.1.27, "ASME Section XI, Subsection IWF." The reactor vessel support ring girder is not an ASME Section XI, Subsection IWF component. The reactor vessel support ring girder is managed under Aging Management Program B.1.30, Structures Monitoring Program.

(b) The drywell lower ring support and the drywell upper lateral support are included in the ASME Class MC supports discussed in LRA Section 2.4.15, Component Supports Commodity Group. The drywell lower ring support and the drywell upper lateral support will be managed under Aging Management Program B.1.27, ASME Section XI, Subsection IWF.

(c) LRA Section 2.4.15, "Component Supports Commodity Group," includes all supports associated with the "Components" listed in LRA Sections 2.3 and 2.4.1 through 2.4.14, with two exceptions:

Table 2.3.1-1 of LRA Section 2.3.1.1, "Reactor Vessel," includes supports for the reactor vessel and reactor vessel internals. The aging management of the support skirts and attachment welds has been analyzed as a TLAA and is discussed in LRA Section 4.3.1, Reactor Vessel Fatigue Analysis. Specifically, the reactor vessel support skirt will be managed for fatigue under aging management program, B.1.34, Metal Fatigue of the Reactor Coolant Pressure Boundary.

Table 2.3.1-2 of LRA Section 2.3.1.2, "Internals," includes components internal to the reactor vessel that provide support for other internal components. Aging Management Programs B.1.2, Water Chemistry, and B.1.9, BWR Vessel Internals, manage the aging of these internal components. Jet pump assemblies and orificed fuel support pieces are managed under Aging Management Program B.1.10, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS). In addition to these Aging Management Programs, several Component Groups found in LRA Table 2.3.1-2 with a structural support function have been analyzed as a TLAA and are discussed in LRA Section 4.2, Neutron Embrittlement of the Reactor Vessel and Internals.

For all other component supports included in LRA Section 2.4.15 (other than the two exceptions discussed), the following Aging Management Programs apply:

B.1.27, "ASME Section XI, Subsection IWF" will manage ASME Class 1, 2, and 3 component supports.

B.1.27, "ASME Section XI, Subsection IWF" will manage ASME Class MC component supports during the period of extended operation, as stated in (b) above.

B.1.2, "Water Chemistry" and AMP B.1.23, "One-Time Inspection" will manage component supports exposed to a torus water environment.

B.1.30, "Structures Monitoring Program" will manage component supports other than in the above categories.

(d) The Component Group, Anchorage to Buildings Including Bolted/Welded Connections, found in LRA Table 2.4-15 includes anchors directly into concrete. The concrete surrounding the anchors is addressed with the corresponding structures as identified in LRA Section 2.4.

The additional information provided by the applicant in its RAI response sufficiently clarifies the scoping and screening for component supports, and clearly identifies the credited AMPs for each subset of component supports. The staff concludes that the applicant has appropriately addressed these components in its scoping and screening review. The staff evaluation of the AMR and AMPs for component supports is in Section 3.5 of this SER. Therefore RAI 2.4-10 is resolved.

2.4.15.3 Conclusions

The staff reviewed LRA Section 2.4.15 to determine whether any structural components of the component supports commodity group that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the structural components of the component supports commodity group that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the structural components of the component supports commodity group that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.16 Insulation Commodity Group

2.4.16.1 Summary of Technical Information in the Application

The applicant described the insulation commodity group in LRA Section 2.4.16 and provided a list of components subject to an AMR in LRA Table 2.4-16.

The insulation commodity group consists of the following categories of insulation:

- mirror insulation inside containment
- insulation and jacketing inside containment
- insulation and jacketing outside containment
- asbestos insulation outside containment
- anti-sweat insulation outside containment
- outdoor insulation and jacketing

Plant areas where systems and equipment in the scope of license renewal require temperature control include—inside the drywell, the ECCS pump rooms, the outboard MSIV rooms, and on outdoor heat-traced piping for freeze protection. Plant areas where insulation jacketing is subjected to periodic wetting is limited to outdoor heat-traced piping.

Insulation materials in use at the stations include both originally installed materials and replacement materials. These include metallic reflective insulation, asbestos, fiberglass batts, calcium silicate, quilted fiberglass blankets, preformed fiberglass, and closed cell foam. Outdoor insulation installed over electric heat tracing consists of either calcium silicate or preformed fiberglass with aluminum jacketing.

Insulation requiring aging management consists of asbestos and fiberglass batt insulation located in the drywell, ECCS pump rooms, outboard MSIV rooms, and outdoor insulation and jacketing installed over heat-traced piping.

In LRA Table 2.4-16, the applicant listed the following component groups requiring AMR for the insulation commodity group:

Component	**Component Intended Function**	**LRA Aging Management Ref No.**
Insulation	Insulating Characteristics	3.2.2.44, 3.2.2.45, 3.2.2.46, 3.2.2.47, 3.3.2.122, 3.4.2.22
Insulation Jacketing	Insulation Jacket Integrity	3.2.2.48, 3.3.2.123, 3.4.2.23

The applicant's AMR results for insulation are provided in LRA Sections 3.2, 3.3, and 3.4.

2.4.16.2 Staff Evaluation

The staff reviewed LRA Section 2.4.16 to determine whether the insulation commodity group components within the scope of license renewal and subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1).

In the performance of the review, the staff selected system functions that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

Based on information provided in LRA Section 2.4-16, the staff cannot identify the insulation and insulation jacketing included in the license renewal scope nor the specific subset that is included in this commodity group. It is also unclear whether insulation and jacketing on the reactor coolant system have been included.

In LRA Table 2.4-16, the aging management references are to LRA Sections 3.2 (Engineered Safety Features), 3.3 (Auxiliary Systems), and 3.4 (Steam and Power Conversion Systems). However, in LRA Section 2.3 (Scoping and Screening Results: Mechanical), insulation is not discussed and there are no references to LRA Section 2.4.16.

In order to complete the screening review for insulation and insulation jacketing, the staff requested the applicant in RAI 2.4-11 to submit the following information:

(a) Specifically identify the mechanical systems or portions of systems that have insulation and/or insulation jacketing within the license renewal scope, and their location in the plant.

(b) Specifically identify the structures and structural components that have insulation and/or insulation jacketing within the license renewal scope, and their location in the plant.

(c) Specifically identify any insulation and/or insulation jacketing within the license renewal scope, but not included in the insulation commodity group; submit the AMR for this insulation and/or insulation jacketing.

(d) List all insulation and insulation jacketing materials included in the insulation commodity group and the results of the AMR for each.

(e) For insulation and insulation jacketing materials not requiring aging management, submit the technical basis for this conclusion, including plant-specific operating experience.

(f) For insulation and insulation jacketing materials requiring aging management, identify the AMP(s) credited to manage aging.

In its response to RAI 2.4-11, the applicant stated the following:

> (a) The methodology used for scoping and screening of mechanical system insulation is described in LRA Section 2.1.6, Additional Considerations Incorporated into the Methodology, Treatment of Piping and Equipment Insulation During Scoping and Screening.
>
> Scoping and screening identified the following systems to have insulation and/or insulation jacketing within the license renewal scope.

System	Location	System	Location
Reactor vessel	Inside Containment	Feedwater system	Inside and Outside Containment
Reactor recirculation system	Inside Containment	Main Condenser	Outside Containment
Reactor core isolation cooling system (Quad Cities only)	Inside and Outside Containment	HVAC - radwaste buidling	Outside Containment

System	Location	System	Location
Head spray system (Dresden only)	Inside Containment	Condensate and condensate booster system	Outside Containment
Reactor vessel head vent system	Inside Containment	Feedwater heater drains and valves	Outside Containment
Nuclear boiler instrumentation system (Quad Cities only)	Inside Containment	Reactor building closed cooling water	Inside and Outside Containment
Shutdown cooling system (Dresden only)	Inside and Outside Containment	Service water system	Outside Containment
Standby liquid control system	Outside Containment	Diesel generator service water system	Outside Containment
Reactor water cleanup system	Inside and Outside Containment	HVAC—main control room	Outside Containment
Isolation condenser (Dresden only)	Inside and Outside Containment	SBO building HVAC	Outside Containment
Core spray system	Inside Containment	Plant heating steam	Outside Containment
Low pressure coolant injection system (Dresden only)	Inside and Outside Containment	HVAC—auxiliary electric room and computer room	Outside Containment
Residual heat removal system (Quad Cities only)	Inside and Outside Containment	HVAC—high radiation sampling system	Outside Containment
Containment cooling service water system (Dresden only)	Outside Containment	Emergency diesel generators and auxiliaries	Outside Containment

System	Location	System	Location
Residual heat removal service water system (Quad Cities only)	Outside Containment	SBO diesel generator and auxiliaries	Outside Containment
High-pressure coolant injection system	Inside and Outside Containment	Drywell nitrogen inerting	Outside Containment
Main steam system	Inside and Outside Containment	Nitrogen containment atmosphere dilution system	Outside Containment
Extraction steam system	Outside Containment		

(b) Scoping and screening identified the following buildings or structures as having insulation (fire wrapping/fire proofing) within the scope of license renewal:

- Reactor Buildings (Section 2.4.2)
- Main Control Room and Auxiliary Electric Equipment Room (Section 2.4.3)
- Turbine Buildings (Section 2.4.4)
- Diesel Generator Buildings (Section 2.4.5)
- Station Blackout Buildings (Section 2.4.6)

(c) For mechanical systems, all insulation and insulation jacketing within the license renewal scope are included in the Insulation Component Group (Section 2.4.16). For buildings and structures, the fire wrapping or fire proofing are included as line items in the LRA Section 2.4 component tables for the buildings listed above. The Aging Management Reference in the Section 2.4 component tables points to the aging management review results.

(d) The requested information for mechanical systems is contained in the LRA at the following points:

Section 3.2, Table 3.2-2, Aging Management References 3.2.2.44, 3.2.2.45, 3.2.2.46, 3.2.2.47 and 3.2.2.48

Section 3.3, Table 3.3-2, Aging Management References 3.3.2.122 and 3.3.2.123

Section 3.4, Table 3.4-2, Aging Management References 3.4.2.22 and 3.4.2.23

The requested information for structures is contained in LRA Section 3.3, Table 3.3-2, Aging Management References 3.3.2.62 and 3.3.2.63.

(e) The line items listed in response to Item (d) include identification of insulation and/or insulation jacketing materials that do not exhibit aging effects and that do not require aging management. This information is included in the columns headed "Aging Effect/Mechanism" and "Aging Management

Program" associated with each line item identified. The "Discussion" column for each line item where there are no aging effects provides a technical basis for this conclusion.

The aging management review that evaluated insulation and insulation jacketing included a search of problem identification forms and work orders to identify documented insulation failures at Dresden or Quad Cities. This search identified a total of fifteen (15) documented insulation failures. Of these fifteen failures, three failures were attributed to age-related degradation, seven failures were attributed to causes unrelated to aging (e.g., damage by personnel), and five were attributed to indeterminate causes.

(f) The requested information for mechanical systems is contained in the LRA at the following points:

- Section 3.2, Table 3.2-2, Aging Management References 3.2.2.44, 3.2.2.45, 3.2.2.46, 3.2.2.47 and 3.2.2.48
- Section 3.3, Table 3.3-2, Aging Management References 3.3.2.122 and 3.3.2.123
- Section 3.4, Table 3.4-2, Aging Management References 3.4.2.22 and 3.4.2.23

The requested information for structures is contained in the LRA at the following points:

- Section 3.3, Table 3.3-2, Aging Management References 3.3.2.62 and 3.3.2.63

The additional information provided by the applicant in its RAI response sufficiently clarifies the scoping and screening for the insulation commodity group, and clearly identifies the aging management reference for each subset of insulation and insulation jacketing. The staff concludes that the applicant has appropriately addressed the insulation commodity group in its scoping and screening review. The staff evaluation of the AMRs for each subset of insulation and insulation jacketing is in Section 3.5 of this SER. RAI 2.4-11 is, therefore, resolved.

2.4.16.3 Conclusions

The staff reviewed LRA Section 2.4.16 to determine whether any components of the insulation commodity group that should be within the scope of license renewal were not identified by the applicant. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. On the basis of its review, the staff concludes that the applicant has adequately identified the components of the insulation commodity group that are within the scope of license renewal, as required by 10 CFR 54(a), and that the applicant has adequately identified the components of the insulation commodity group that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.5 Scoping and Screening Results: Electrical and Instrumentation and Controls

This section addresses the scoping and screening results of electrical and instrumentation and control (I&C) systems at Dresden and Quad Cities for license renewal. Per 10 CFR 54.21 (a)(1) an applicant is required to identify and list structures and components subject to an AMR. These are passive, long-lived structures and components that are within the scope of license renewal. To verify that the applicant has properly implemented its methodology, the staff focuses its review on the implementation results. Such a focus allows the staff to confirm that there is no omission of electrical system components that are subject to an AMR. If the review identifies no omission, the staff has the basis to find that there is reasonable assurance that the applicant has identified the electrical system components that are subject to an AMR.

The applicant utilized the guidance provided in NEI 95-10, Appendix B, to define passive, long-lived electrical commodities. As described in LRA Section 2.1.2, the passive and long-lived electrical and instrumentation and control component groups were evaluated using plant "spaces" approach to identify aging effects, and then, "bounding environmental conditions" were used to evaluate the identified aging effects with respect to component function.

The following electrical commodity groups were determined to require AMR:

- Cables and connections (splices, connectors, fuse blocks, and terminal blocks)
- Bus Duct
- High-voltage transmission conductors and insulators
- Electrical penetration

2.5.1 Insulated Cables and Connections

LRA Section 2.5.1.1, "Cables And Connections," identifies cables and connections as long-lived and non-EQ component groups that perform an electrical passive function in support of its system intended function as defined by 10 CFR 54.21 (a)(1)(i).

2.5.1.1 Summary of Technical Information in the Application

The applicant describes the insulated cable and connections in LRA Section 2.5.1.1 and provides a list of components subject to an AMR in LRA Table 2.5-1.

The applicant stated that all electrical insulated cables and connections were evaluated, using the "spaces" approach, for aging management based on the comparison of material property capability with environmental conditions. As appropriate, electrical cables and connections were excluded from aging management if they were identified as feeding an electrical component that performed no license renewal intended function.

The function of insulated cables and connections is to electrically connect specified sections of an electrical circuit to deliver voltage, current or signals. Electrical cables and their connections are reviewed as commodity groups. The types of connections included in this review are splices, connectors, fuse blocks, and terminal blocks.

2.5.1.2 Staff Evaluation

The staff reviewed LRA Section 2.5.1.1 to determine whether the insulated cable and connections within the scope of license renewal and are subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21 (a)(1).

As part of the review, the staff selected system functions described in UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule.. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

The applicant evaluated the cables and connectors as a single component commodity group. Insulated cables and connections that perform an intended function within the scope of license renewal, but are not included in the EQ Program, meet the criterion of 10 CFR 54.21 (a)(1)(ii) and are subject to AMR. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

The applicant stated that "as appropriate, electrical cables and connections were excluded from aging management if they were identified as feeding an electrical component that performed no license renewal intended function." The staff requested the applicant to clarify whether Dresden and Quad Cities AMR for cables have included those cables that do not perform license renewal intended function, but share same cable trays/raceways with cables that do perform license renewal intended function (RAI 2.5-2(a)).

In its response dated November 20, 2003, the applicant stated that cables that perform no license renewal intended function and share the same cable trays/raceways with cables that do perform license renewal function are included in the scope of license renewal. Because these cables share the same trays/raceways, the applicant included all of the cables within the scope of license renewal. The only cables that were excluded from the scope of license renewal are the medium voltage cables to the Quad Cities circulating pump motors and the cables within the Radwaste Building. The circulating pump motor cables are routed in dedicated raceways that do not contain cables performing license renewal functions. The Radwaste Building does not contain any electrical components within the scope of license renewal. As such, all of the cables contained in the trays/raceways found in the Radwaste Building are excluded from the scope of license renewal and do not require aging management.

The staff agrees that the applicant has correctly identified the cables and connections as component commodity group that perform their function without moving parts or a change in configuration or properties (passive and long lived), and, are therefore subject to an AMR.

2.5.1.3 Conclusions

The staff reviewed the LRA to determine whether any structures, systems, or components that should be within the scope of license renewal were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the insulated cables and connections that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the insulated cable and connections that are subject to an aging management review, as required by 10 CFR 54.21(a)(1).

2.5.2 Bus Duct

LRA Section 2.5.1.2, "Bus Duct," identifies bus ducts as passive long-lived component commodity groups that connect power supplies and switchgear in order to deliver voltage and current to support the system's intended function as defined in 10 CFR 54.21(a)(1)(i).

2.5.2.1 Summary of Technical Information in the Application

The applicant describes the bus ducts in LRA Section 2.5.1.2 and provides a list of components subject to an AMR in LRA Table 3.6-2.

The bus ducts within the scope of license renewal include those bus ducts used for safety-related systems and those associated with the 4160 V power feeds between the reserve auxiliary transformers (RATs) and switchgear. The bus ducts utilize pre-assembled raceway (enclosure) design with conductors supported by electrical insulators. The function of bus ducts is to electrically connect power supplies and load centers to deliver voltage and current. The function of bus duct insulators is to support and insulate the bus bar conductors.

2.5.2.2 Staff Evaluation

The staff reviewed LRA Section 2.5.1.2 to determine whether the bus ducts within the scope of license renewal and that are subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The bus ducts identified by the applicant as requiring AMR are used for safety-related systems and those associated with the 4160V power feeds between the reserve auxiliary transformers and switchgear. The staff reviewed these component categories against the requirements of 10 CFR 54.4 (a)(1) and 10 CFR 54.4(a)(3) and found these categories are included in these requirements.

As part of this review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

2.5.2.3 Conclusions

The staff reviewed the LRA to determine whether any structures, systems, or components that should be within the scope of license renewal were not identified by the applicant. No omissions were found. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the bus duct components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the bus ducts components that are subject to an aging management review, as required by 10 CFR 54.21 (a)(1).

2.5.3 High Voltage Transmission Conductors and Insulators

LRA Section 2.5.1.3, "High Voltage Transmission Conductors and Insulators," identifies high voltage transmission conductors and insulators as passive long-lived component commodity groups that connect switchyard bus and reserve auxiliary transformers in order to supply offsite power to the plant systems and perform its intended function as defined in 10 CFR 54.21 (a)(1)(i).

2.5.3.1 Summary of Technical Information in the Application

The applicant describes the high voltage transmission conductors and insulators in LRA Section 2.5.1.3. The high voltage transmission conductors and insulators within the scope of license renewal rule are those associated with the power feeds from the switchyard to RATs. The function of the high voltage transmission conductors is to supply power to the plant systems through the RATs. The function of high voltage insulators is to support and insulate the high voltage transmission conductors.

2.5.3.2 Staff Evaluation

The staff reviewed LRA Section 2.5.1.3 to determine whether the high voltage transmission conductors and insulators within the scope of license renewal and that are subject to an AMR have been identified in accordance with 10 CFR 54.4 and 54.21(a)(1). The high voltage transmission conductors and insulators identified by the applicant as requiring AMR are associated with the power feeds from the switchyard to the reserve auxiliary transformers. The staff reviewed these component categories against the requirements of 10 CFR 54.4(a)(3) and found this category is included in this requirement.

In the performance of the review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

On the basis of its review, the staff finds that the switchyard bus and high-voltage transmission conductor connections are passive, long-lived electrical components subject to an AMR and are not identified by the applicant. The staff asked the applicant to provide justification for excluding these components from AMR; otherwise, the applicant was to submit an AMR for the subject components (RAI 2.5-2(b)). In its response dated November 20, 2003, the applicant stated that switchyard buses and high voltage transmission conductor connections are in the scope of license renewal and that the associated AMR is provided in Section 3.6 of the LRA.

2.5.3.3 Conclusions

The staff reviewed the LRA to determine whether any structures, systems, or components that should be within the scope of license renewal were not identified by the applicant. The staff did not identify any omissions. In addition, the staff performed an independent assessment to determine whether any components that should be subject to an AMR were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified high voltage transmission conductors and connections, insulators, and switchyard bus that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified high voltage transmission conductors and connections, insulators, and switchyard bus that are subject to an aging management review, as required by 10 CFR 54.21 (a)(1).

2.5.4 Electrical/I&C Penetration

Electrical/I&C penetration are used to pass electrical circuits through the containment wall while maintaining containment integrity. They provide electrical continuity for the circuit, as well as a pressure boundary for the containment. The pressure boundary function of electrical penetration is addressed in LRA Section 2.4-1.

2.5.4.1 Summary of Technical Information in the Application

The applicant describes the electrical/I&C penetration in LRA Section 2.5.1.4. The applicant stated that electrical penetrations perform the functions of primary containment boundary (pressure integrity) and electrical continuity across the primary containment boundary. All primary containment electrical penetrations are included in the scope of the rule. The electrical continuity function of penetrations is managed under environment qualification (EQ) program which is discussed in Section 4.4, Environmental Qualification of Electrical Equipment(EQ). The pressure boundary function of every primary containment electrical penetration is evaluated in LRA Section 2.4.1, Primary Containment, and the aging management program is referenced in Section 3.5.1.3.

2.5.4.2 Staff Evaluation

The staff reviewed Section 2.5.1.4 of the LRA to determine whether the applicant has identified the electrical components within the scope of license renewal, in accordance with 10 CFR 54.4, and those subject to an AMR, in accordance with 10 CFR 54.21 (a)(1).

As part of this review, the staff selected system functions described in the UFSAR that were set forth in 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the Rule. The staff also focused on components that were not identified as being subject to an AMR to determine if any components were omitted.

The staff asked the applicant whether there are any electrical penetrations that are not covered under EQ program (RAI 3.6-2). In its response dated October 3, 2003, the applicant stated that at Dresden Station, all electrical penetrations are covered under the Environmental Qualification (EQ) program. However, at Quad Cities Station, all but three electrical related penetrations (1-X102B, 2-X100A, and 2-X105A) are part of the station EQ program. These three penetrations serve circuits (such as drywell booster fans and main steam line vibration monitoring instrumentation) that do not perform any license renewal intended function. As stated in Section 2.5.1.4 of the LRA, the intended function (electrical continuity) is managed by the EQ program. The mechanical and structural related intended functions of all electrical penetrations, including the three Quad Cities penetrations not included within the station EQ program, are addressed in Table 2.4-1 under Component Group "Containment Penetrations (Electrical)" and the associated aging management is discussed in Table 3.5-1, Aging Management Reference 3.5.1.3 of the LRA.

2.5.4.3 Conclusions

The staff reviewed the LRA to determine whether any structures, systems, or components that should be within the scope of license renewal were not identified by the applicant. The staff did not identify any omissions. On the basis of this review, the staff concludes that the applicant has appropriately identified the components of the electrical/I&C penetrations that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has appropriately identified the components of the electrical/I&C penetration assemblies system that are subject to an aging management review, as required by 10 CFR 54.21 (a)(1).

2.5.5 References

1. NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54-The License Renewal Rule," Revision 3, Nuclear Energy Institute, March 2001.

2. NUREG-1801, "Generic Aging Lessons Learned (GALL) Report, U.S. Nuclear Regulatory Commission," April 2001.

3. NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," April 2001.

4. 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

5. NRC letter to Alan Nelson and David Lochbaum, "Staff Guidance On Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for License Renewal (10 CFR 54.4(a)(3)," dated April 1, 2002.