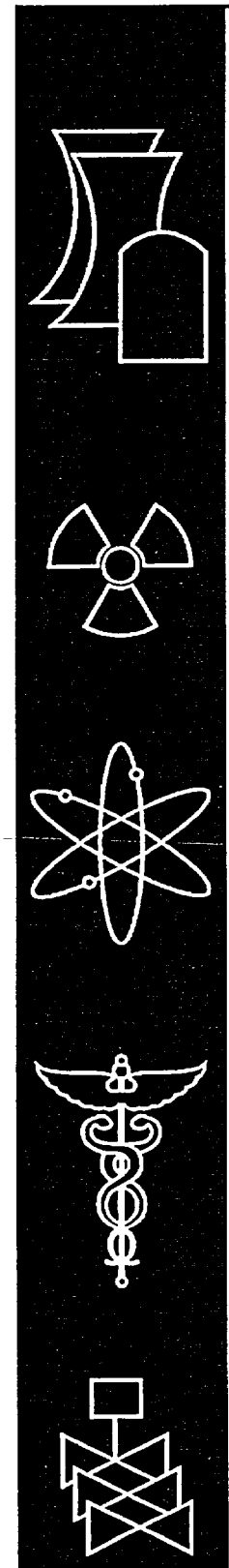
NUREG-1772



# Safety Evaluation Report

Related to the License Renewal of McGuire Nuclear Station, Units 1 and 2, and Catawba Nuclear Station, Units 1 and 2

Docket Nos. 50-369, 50-370, 50-413, and 50-414

Duke Energy Corporation

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

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NUREG-1772

# Safety Evaluation Report

Related to the License Renewal of McGuire Nuclear Station, Units 1 and 2, and Catawba Nuclear Station, Units 1 and 2

Docket Nos. 50-369, 50-370, 50-413, and 50-414

Duke Energy Corporation

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Prepared by
R. Franovich

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

## ABSTRACT

This safety evaluation report documents the Nuclear Regulatory Commission's (NRC's) review of Duke Energy Corporation's (Duke's) application to renew the operating licenses for McGuire Nuclear Station, Units 1 and 2 (McGuire 1 and 2), and Catawba Nuclear Station, Units 1 and 2 (Catawba 1 and 2). The NRC's Office of Nuclear Reactor Regulation has reviewed the McGuire 1 and 2 and Catawba 1 and 2 license renewal application for compliance with the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared this report to document its findings.

On June 13, 2001, Duke submitted applications for renewal of McGuire 1 and 2 Operating License Nos. NPF-9 and NPF-17, which were issued pursuant to Section 103 of the Atomic Energy Act of 1954, as amended, for a period of up to 20 years beyond the current license expiration dates of June 12, 2021, and March 3, 2023, for McGuire 1 and 2, respectively. The McGuire nuclear facility is located 17 miles north-northwest of Charlotte, North Carolina, in Mecklenburg County. McGuire 1 and 2 are four-loop, Westinghouse pressurized-water reactors with nuclear steam supply systems designed to generate 3411 megawatts thermal, or 1129 megawatts electric.

In the same submittal of June 13, 2001, Duke requested renewal of the Catawba 1 and 2 Operating License Nos. NPF-35 and NPF-52, which were issued under Section 103 of the Atomic Energy Act of 1954, as amended, for a period of up to 19 years beyond the current license expiration dates of December 6, 2024, and February 24, 2026, respectively. The Catawba nuclear facility is located 18 miles southwest of Charlotte, North Carolina, in York County. Catawba 1 and 2 are four-loop, Westinghouse pressurized-water reactors with nuclear steam supply systems designed to generate 3411 megawatts thermal, or 1129 megawatts electric.

The NRC McGuire and Catawba license renewal project manager is Rani Franovich. Ms. Franovich may be reached at 301-415-1868. 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

| | |
|---|---|
| ACI | American Concrete Institute |
| ACRS | Advisory Committee on Reactor Safeguards |
| ACSR | aluminum conductor steel reinforced |
| AFW | auxiliary feedwater (system) |
| AMP | aging management program |
| AMR | aging management review |
| ANSI | American National Standards Institute |
| AS | auxiliary steam (system) |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| BMI | bottom-mounted instrumentation |
| BTP | Branch Technical Position |
| BWI | Babcock and Wilcox International |
| CASS | cast austenitic stainless steel |
| CCW | condenser circulating water (system) |
| CFR | Code of Federal Regulations |
| CIV | containment isolation valve |
| CLB | current licensing basis |
| CRDM | control rod drive mechanism |
| CSS | containment spray system |
| CUF | cumulative usage factor |
| CVCS | chemical and volume control system |
| DBA | design basis accident |
| DBD | design basis document |
| ECCS | emergency core cooling systems |
| ECT | eddy current test |
| EFPY | effective full-power years |
| ELL | Electrical Licensing Library |
| EOC | end of cycle |
| EOLE | end of life extended |
| EPDM | ethylene propylene dienyl monomer |
| EPL | vital batteries system |
| EPQ | diesel generator batteries system |
| EPRI | Electric Power Research Institute |
| EQ | environmental qualification |
| EQD | standby shutdown facility diesel batteries system |
| ETM | standby shutdown facility batteries system |
| FAC | flow-accelerated corrosion |
| FD | (system) flow diagram |
| FI | filtration |
| FP | fire protection |
| FSAR | final safety analysis report |
| GALL | Generic Aging Lessons Learned (Report) |
| GDC | general design criterion or general design criteria |
| GEIS | generic environmental impact statement |

| | |
|---|---|
| gpm | gallons per minute |
| GSI | generic safety issue |
| HAZ | heat-affected zone |
| HELB | high-energy line break |
| HVAC | heating, ventilation, and air conditioning |
| HT | heat transfer |
| I&C | instrumentation and controls |
| IASCC | irradiation-assisted stress corrosion cracking |
| ID | inner diameter |
| IGSCC | intergranular stress corrosion cracking |
| IPA | integrated plant assessment |
| IR | insulation resistance |
| ISG | interim staff guidance |
| ISI | inservice inspection |
| ITS | Improved Technical Specifications |
| LBB | leak-before-break (analysis) |
| LEFM | linear elastic fracture mechanics |
| LER | Licensee Event Report |
| LOCA | loss-of-coolant accident |
| LRA | license renewal application |
| LWR | light-water reactor |
| MeV | million electron volts |
| MIC | microbiologically induced corrosion |
| Mpa | mega pascals |
| MRP | Materials Reliability Project |
| MW | megawatts |
| NC | reactor coolant |
| NDT | nil ductility temperature, non-destructive testing |
| NEI | Nuclear Energy Institute |
| NEPA | National Environmental Policy Act |
| NFPA | National Fire Protection Association |
| NPAR | nuclear plant aging research |
| NRC | Nuclear Regulatory Commission |
| NSAC | Nuclear Safety Analysis Center |
| NSD | Nuclear System Directive |
| NSSS | nuclear steam supply system |
| NSW | nuclear service water (system) |
| NW | containment valve injection water (system) |
| ODSCC | outside diameter stress corrosion cracking |
| OSHA | Occupational Safety and Health Administration |
| P-T | pressure-temperature |
| P&ID | piping and instrumentation diagram |
| PB | pressure boundary |
| PCB | power circuit breaker |
| PIP | Problem Investigation Process |
| PORV | power-operated relief valve |
| ppb | parts per billion |
| ppm | parts per million |

| | |
|---|---|
| psig | pounds per square inch gauge |
| PTS | pressurized thermal shock |
| PWHT | post-weld heat treated |
| PWR | pressurized water reactor |
| PWSCC | primary water stress corrosion cracking |
| RAI | request for additional information |
| RCCA | rod cluster control assembly |
| RCP | reactor coolant pump |
| RCS | reactor coolant system |
| RF | interior fire water (system) |
| RG | regulatory guide |
| RHR | residual heat removal (system) |
| RPV | reactor pressure vessel |
| RTD | resistance temperature detector |
| RSG | replacement steam generator |
| RT | reference temperature |
| RV | reactor vessel |
| RVI | reactor vessel internals |
| RVID | Reactor Vessel Integrity Database |
| RWST | refueling water storage tank |
| SBO | station blackout (event) |
| SCC | stress corrosion cracking |
| SCs | structures and components |
| SER | safety evaluation report |
| SFP | spent fuel pool |
| SG | steam generator |
| SIS | safety injection system |
| SLC | Selected Licensee Commitments |
| SNSW | standby nuclear service water |
| SNSWP | standby nuclear service water pond |
| SR | surveillance requirement |
| SRP | Standard Review Plan |
| SCC | stress corrosion cracking |
| SCV | steel containment vessel |
| SE | safety evaluation |
| SER | safety evaluation report |
| SOC | Statement of Considerations |
| SSs | systems and structures |
| SSCs | systems, structures, and components |
| SSE | safe-shutdown earthquake |
| SSF | standby shutdown facility |
| SSS | standby shutdown system |
| TFMP | Thermal Fatigue Management Program |
| TGSCC | transgranular stress corrosion cracking |
| TH | throttle |
| TLAA | time-limited aging analysis |
| TR | testing requirement |
| TS | technical specification(s) |

| | |
|---|---|
| TSSR | technical specification surveillance requirement |
| UFSAR | updated final safety analysis report |
| UHI | upper head injection |
| UT | ultrasonic testing |
| VA | auxiliary building ventilation (system) |
| VC | control area ventilation (system) |
| VCP | Vessel Closure Penetration (Nozzle Inspection Program) |
| VD | diesel building ventilation (system) |
| VE | annulus ventilation (system) |
| VF | fuel handling building ventilation (system) |
| VHP | vessel head penetration |
| VK | miscellaneous structures ventilation (system) |
| VT | visual examination |
| W | Westinghouse |
| WCAP | Westinghouse topical report |
| WOG | Westinghouse Owners Group |
| YC | control area chilled water (system) |

# 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 McGuire Nuclear Station, Units 1 and 2 (McGuire or McGuire 1 and 2), and Catawba Nuclear Station, Units 1 and 2 (Catawba or Catawba 1 and 2), filed by Duke Energy Corporation (Duke or the applicant). Throughout this SER, "McGuire" or "Catawba" refers to both units (Unit 1 and Unit 2). When the staff discusses information specific to a particular unit, it will refer to that unit as McGuire 1, McGuire 2, Catawba 1, or Catawba 2.

By letter dated June 13, 2001, Duke submitted its application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of the McGuire and Catawba units' operating licenses for up to an additional 20 years. The application was received by the NRC on June 14, 2001. The NRC staff reviewed the McGuire and Catawba license renewal application (LRA) for compliance with the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared this report to document its findings. The project manager for the McGuire and Catawba safety review is Rani Franovich. Ms. Franovich may be contacted by telephone at (301) 415-1868 or by electronic mail at rlf2@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: Rani Franovich, Mail Stop O-12D3

In its LRA, the applicant requested renewal of the operating licenses issued under Section 103 of the Atomic Energy Act of 1954, as amended, for McGuire 1 and 2 (License Nos. NPF-9 and NPF-17) and Catawba 1 and 2 (License Nos. NPF-35 and NPF-52). For McGuire 1, Duke requested a period of 20 years beyond the current license expiration date of June 12, 2021.

The current operating licenses for McGuire 2, Catawba 1, and Catawba 2 expire on March 3, 2023, December 6, 2024, and February 24, 2024, respectively. Duke had requested, by letters dated June 22, 1999, an exemption from 10 CFR 54.17(c), which prohibits an applicant for renewal from submitting its application earlier than 20 years before the expiration of its current operating license. By letters dated October 1, 2001, the NRC staff issued exemptions from this requirement for McGuire 2 and Catawba 1 and 2 with the safety evaluation reports enclosed. Therefore, in its license renewal application, Duke requested a period of 40 years from the date of the issuance of the renewed licenses for McGuire 2 and Catawba 1 and 2, which is less than 20 years beyond the current license expiration dates for these units.

In Section 1.5 of its LRA and in the June 13, 2002, transmittal letter, Duke Energy Corporation made the following request:

> As reflected in these proposed revisions to the license expiration dates, Duke recognizes the legal limits associated with the term of renewed operating licenses. We also note that the technical and environmental reviews performed in connection with this Application cover operation for a period of sixty years. Duke therefore requests that the NRC complete its safety and environmental reviews

such that 60-years of operation are evaluated even though the renewed licenses issued may actually provide somewhat less than an additional 20-years of operation beyond the end of the current operating licenses of one or more of the McGuire or Catawba units.

To accommodate this request, the staff focused its attention on the time-limited aging analyses (TLAAs) provided in Chapter 4 of the LRA and identified the following sections of the LRA that described TLAAs that assumed 60 years of plant operation:

- Section 4.2, "Reactor Vessel Neutron Embrittlement"
- Section 4.3.2, "ASME Section III, Class 2 and 3 Piping Fatigue"
- Section 4.7.1, "Reactor Coolant Pump Flywheel Fatigue"

Other Chapter 4 sections of the LRA identify aging effects that will be managed by an aging management program, in accordance with 10 CFR 54.21(c)(iii), or identify aging that is not applicable to either McGuire or Catawba. The staff reviewed the three LRA Sections and associated TLAAs listed above and concluded that they remain valid for 60 years of operation. Therefore, they remain valid for the period of extended operation in accordance with 10 CFR 54.21(c).

The McGuire plant is located in northwestern Mecklenburg County, North Carolina, 17 miles north-northwest of Charlotte, North Carolina. Both McGuire units consist of Westinghouse pressurized water reactors with nuclear steam supply systems designed to operate at core power levels up to 3411 megawatts thermal, or approximately 1129 megawatts electric. Details concerning the plant and the site are found in the updated final safety analysis report (UFSAR) for McGuire.

The Catawba plant is located in the north central portion of South Carolina, in northeastern York County, approximately 18 miles southwest of Charlotte, North Carolina. Both Catawba units consist of Westinghouse pressurized water reactors with nuclear steam supply systems designed to operate at core power levels up to 3411 megawatts thermal, or approximately 1129 megawatts electric. Details concerning the plant and the site are found in the UFSAR for Catawba.

The license renewal process proceeds along two tracks: (1) a technical review of safety issues and, (2) an environmental review. The requirements for these two reviews are stated in NRC regulations 10 CFR Parts 54 and 51, respectively. The safety review is based on Duke's LRA and on the applicant's answers to requests for additional information (RAIs) from the NRC staff. In meetings and docketed correspondence, Duke has also supplemented its answers to the RAIs. 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, MD 20852-2738. In addition, the McGuire and Catawba LRA and significant information and material related to the license renewal review are available on the NRC web page at www.nrc.gov.

This SER summarizes the findings of the staff's safety review of the McGuire and Catawba LRA and describes 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 the NRC "Standard Review Plan (SRP) for the Review of License Renewal Applications for Nuclear Power Plants," which was issued as NUREG-1800 in July 2001.

Chapters 2 through 4 of the SER document the staff's review and evaluation of license renewal issues that have been considered during the review of the LRA. Chapter 5 is reserved for the report of the Advisory Committee on Reactor Safeguards (ACRS). Appendix A is a chronology of the NRC's and the applicant's principal correspondence related to the review of the LRA. Appendix B is a bibliography of the documents used during the review. The NRC staff's principal reviewers for this project are listed in Appendix C. Appendix D contains a list of commitments provided by the applicant in a letter dated December 16, 2002, and confirmed by the staff.

In accordance with 10 CFR Part 51, the staff prepared draft plant-specific supplements to the generic environmental impact statement (GEIS). The supplements discuss the environmental considerations related to renewing the licenses for McGuire and Catawba. The draft plant-specific supplements to the GEIS were issued separately from this report. Specifically, NUREG-1437, Supplement 8, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding McGuire Nuclear Station, Units 1 and 2," issued May 2002, is the draft environmental impact statement for McGuire. Similarly, NUREG-1437, Supplement 9, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Catawba Nuclear Station, Units 1 and 2," issued May 2002, is the draft environmental impact statement for McGuire.

## 1.2 License Renewal Background

Pursuant to the Atomic Energy Act of 1954, as amended, and NRC regulations, licenses for commercial power reactors to operate 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, not 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. That led the NRC to establish 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 involve 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 life extension for nuclear power plants.

In 1991, the NRC published the license renewal rule in 10 CFR Part 54. The NRC participated in an industry-sponsored demonstration program to apply the rule to pilot plants and develop experience to establish 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 programs, particularly for the implementation of the maintenance rule, which also manages plant aging phenomena.

As a result, in 1995 the NRC amended the license renewal rule. The amended 10 CFR Part 54 established a regulatory process that is expected to be simpler, more stable, and more predictable than the previous license renewal rule. In particular, 10 CFR Part 54 was clarified to focus on managing the adverse effects of aging rather than on identifying all aging mechanisms. The rule changes were intended to ensure that important systems, structures, and components (SSCs) will continue to perform their intended functions in 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 provides and maintains 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 and a few other safety 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, the rule (in 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 Commission's regulations for fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout.

Pursuant to 10 CFR 54.21(a), the applicant must review all SSCs that are within the scope of the rule to identify SCs that are subject to an aging management review (AMR). 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), the applicant 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 and activities 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), each LRA is required to include a supplement to the final safety analysis report (FSAR). This FSAR 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 operating term of the plant, 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 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 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating License;" NUREG-1800, "Standard Review Plan for the Review of License Renewal Application 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 draft versions of these documents were issued for public comment on August 31, 2000 (64 FR 53047). The staff assessment of public comments was issued in July 2001 as NUREG-1739, "Analysis of Public Comments on the Improved License Renewal Guidance Documents." The regulatory guide endorsed an implementation guideline prepared by the Nuclear Energy Institute (NEI) as an acceptable method of implementing the license renewal rule. The NEI guideline is NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Revision 3, issued in March 2001. The regulatory guide will be used along with the SRP to review this LRA and to assess topical reports on license renewal submitted by industry groups. As experience is gained, the NRC will improve the SRP and clarify the regulatory guidance.

### 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 a "Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants" (NUREG-1437) 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 10 CFR Part 51, Subpart A, Appendix B. 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 environmental impacts of license renewal that must be evaluated on a plant-specific basis are identified as Category 2 issues in 10 CFR Part 51, Subpart A, Appendix B. Such analyses 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 performs a plant-specific review of the environmental impacts of license renewal, including whether there is new and significant information not considered in the GEIS. Four public meetings were held, two near McGuire on September 25, 2001, and two near Catawba on October 23, 2001, as part of the NRC's scoping process to identify environmental issues specific to the plant. The results of the environmental review and a preliminary recommendation on the license renewal action were documented in NRC draft plant-specific Supplements 8 and 9 to the GEIS, which were issued on May 6, 2002, and May 13, 2002, for McGuire and Catawba, respectively. Four additional public meetings have been conducted, two near McGuire on June 12, 2002, and two near Catawba on June 27, 2002 (during the 75-day comment period for draft plant-specific Supplements 8 and 9 to the GEIS). At the meetings, the staff described the environmental review and answered questions from members of the public to help them formulate their comments on the review. Final Supplements 8 and 9 to the GEIS were issued in December 2002.

Draft Supplements 8 and 9 to the GEIS present the NRC's preliminary environmental analysis of the effects of renewing the McGuire and Catawba operating licenses for up to an additional 20 years. The analysis considers and weighs the environmental effects and alternatives that are available to avoid adverse environmental effects. On the basis of analyses and findings in the "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants" (NUREG-1437), the environmental reports submitted by the applicant, consultation with other Federal, State, and local agencies, its own independent review, and its consideration of public comments, the staff recommended in Supplements 8 and 9 to NUREG-1437 that the Commission determine that the adverse environmental impacts of license renewal for McGuire and Catawba are not so great that preserving the option of license renewal for energy planning decisionmaking would be unreasonable.

## 1.3 Summary of 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 McGuire and Catawba LRA in accordance with Commission guidance and the requirements of 10 CFR 54.19, 54.21, 54.22, 54.23, and 54.25. The standards for renewing a license are contained in 10 CFR 54.29.

In 10 CFR 54.19(a), the Commission requires a license renewal applicant to submit general information. Duke submitted this general information in Chapter 1 of its application for renewal of the McGuire and Catawba operating licenses. In 10 CFR 54.19(b), the Commission requires that 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 states the following in Section 1.6 of its LRA regarding this issue:

> The current indemnity agreement for McGuire Nuclear Station (B-83) states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement. Item 3 of the Attachment to the indemnity agreement, as revised through Amendment No. 10, lists NPF-9 and NPF-17, the license numbers for McGuire Nuclear Station Units 1 and 2, respectively. Should the license numbers be changed upon issuance of the renewed licenses, Duke requests that conforming changes be made to Item 3 of the Attachment to Indemnity Agreement B-83, and any other sections of the indemnity agreement as appropriate.

> The current indemnity agreement for Catawba Nuclear Station (B-100) states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement Item 3 of the Attachment to the indemnity agreement, as revised through Amendment No. 9, lists NPF-35 and NPF-52, the license numbers for Catawba Nuclear Station Units 1 and 2, respectively. Should the license numbers be changed upon issuance of the renewed licenses, Duke requests that conforming changes be made to Item 3 of the Attachment to Indemnity Agreement B-100, and any other sections of the indemnity agreement as appropriate.

The staff will use the original license number for 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 application for a renewed license for a nuclear facility contain: (1) an integrated plant assessment (IPA), (2) current licensing basis changes during NRC review of the LRA, (3) an evaluation of TLAAs, and (4) an FSAR supplement. The applicant submitted the information required by 10 CFR 54.21(a), (c), and (d) in the Technical Information volume of the LRA. By letter dated June 25, 2002, the applicant submitted Amendment 1 to the LRA, which summarizes changes to the current licensing basis that have occurred at McGuire and Catawba during the staff's review of the LRA. This submittal satisfies the requirement of 10 CFR 54.21(b) and has been reviewed by the staff.

In 10 CFR 54.22, the Commission states 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 McGuire 1 and 2 and Catawba 1 and 2.

The staff evaluated the technical information required by 10 CFR 54.21 and 54.22 in accordance with the NRC's regulations and the guidance provided in the initial draft SRP. The staff's evaluation of this information is documented in Chapters 2, 3, and 4 of this SER.

The staff's evaluation of the environmental information required by 10 CFR 54.23 is documented in the draft plant-specific supplements to the GEIS (NUREG-1437, Supplements 8 and 9).

### 1.3.1 Westinghouse Topical Reports

In accordance with 10 CFR 54.17(e), the applicant references certain Westinghouse Owners Group topical reports in each LRA. The applicant used topical reports to generically demonstrate that applicable aging effects for reactor coolant system components will be adequately managed for the period of extended operation.

- WCAP-14535A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," Section 4.3.1, Westinghouse Electric Corporation, November 1996

- WCAP-10456, "The Effects of Thermal Aging on the Structural Integrity of Cast Stainless Steel Piping for Westinghouse Nuclear Steam Supply Systems," Westinghouse Electric Corporation, November 1983

- WCAP-10585, "Technical Basis For Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis For McGuire Units 1 and 2," June 1984, Westinghouse Electric Corporation

- WCAP-10546, "Technical Basis For Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis For Catawba Units 1 and 2," June 1984, Westinghouse Electric Corporation

The staff issued the safety evaluation for WCAP-14535A on September 12, 1996. In accordance with the procedures provided in NUREG-0390, "Topical Report Review Status," the staff requested that the Westinghouse Owners Group publish the accepted versions of the reports incorporating the transmittal letter and the staff's safety evaluation between the title page and the abstract. The accepted versions have an *A* (for "accepted") after the report identification number.

The safety evaluations of the topical reports are intended to be stand-alone documents. An applicant incorporating the topical reports by reference into its LRA must ensure that the conditions of approval stated in the safety evaluations are met. The staff's evaluation of the applicant's incorporation of the topical reports into the LRA is documented in Chapter 4 of this SER.

## 1.4 Summary of Open Items and Confirmatory Items

As a result of its review, the NRC staff issued an SER with open items on August 14, 2002, and identified and documented 41 open items and 4 confirmatory items. An issue was characterized as an open item if the applicant had not presented a sufficient basis for resolution, or if questions or concerns about the applicant's license renewal application emerged late in the staff's review, such that resolution could not be proposed by the applicant before the SER with open items was issued. An issue was characterized as confirmatory if the staff and applicant had agreed to a resolution, but information in official submittals from the applicant was needed. New open items involved issues that had not been the subject of staff RAIs. The applicant responded to the open and confirmatory items, as well as two other emerging issues pertaining to the treatment of electrical fuse holders and aging management of the pressurizer surge and spray nozzle thermal sleeves and the steam generator divider plates, in letters dated October 2, 2002, October 28, 2002, November 5, 2002, November 14, 2002, November 18, 2002, and November 21, 2002. The staff's evaluation of the applicant's responses to the emerging issues is documented in Sections 2.5.2.2, 3.1.2.2.1, and 3.6.1.2.1 of this SER.

The applicant's responses to open and confirmatory items are described below.

Open items 2.3-1 and 2.3-2. The applicant failed to perform an AMR for the housings of active components (e.g., fans and dampers) that may perform critical pressure retention and/or structural integrity functions. Failure to maintain that function could prevent the associated active component from performing its function. Since these housings are within the scope of license renewal and are long-lived and passive, they are subject to an AMR in accordance with 10 CFR 54.21.

In its response to SER open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the fan and damper housings of ventilation systems that are in scope at McGuire and Catawba. The staff found the applicant's response sufficient to resolve open items 2.3-1 and 2.3-2. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER. The staff's evaluation of the AMR results is documented for applicable systems in Sections 3.2 and 3.3 of this SER.

Open item 2.3-3. The AMP (the Inspection Program for Civil Engineering Structures and Components) credited by the applicant for monitoring the aging of structures that include structural sealants as sub-components does not include, within its scope, building sealants. Therefore, this AMP was considered inadequate to manage the aging of building sealants, which are long-lived, passive structural sub-components within the scope of license renewal.

In its response to this open item, dated October 28, 2002, the applicant credited a visual inspection of the structural sealant used to maintain ventilation pressure boundary integrity of the control room area, emergency core cooling pump rooms, annulus, and fuel handling building. The staff found the applicant's response sufficient to resolve open item 2.3-3. The staff's evaluation of the Ventilation Area Pressure Boundary Sealants Inspection Program is documented in Section 3.0.3.19 of this SER.

Open item 2.3.3.12.2-1. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.12-1, that the applicant provide the basis for not listing the turbocharger turbine flexible hoses in Table 3.3-15, since these components are passive, long-lived, and have intended functions to maintain pressure boundary. In its response dated April 15, 2002, the applicant stated that the flexible hose is replaced during periodic maintenance. The applicant implied that the hose is replaced based on qualified life in accordance with 10 CFR 54.21(a)(1)(i) and is, therefore, not subject to an AMR. However, since this was not clearly stated in the RAI response, this issue was characterized as an open item.

In its response to this open item, dated October 28, 2002, the applicant confirmed that the flexible hose in the diesel generator cooling water system is replaced on a qualified life every 6 years and, therefore, is not subject to an AMR. The staff agreed with this conclusion. Therefore, open item 2.3.3.12.2-1 is closed.

Open item 2.3.3.13.2-1. The applicant did not provide sufficient information in its response to RAI 2.3.3.13-1 to enable the staff to evaluate the adequacy of its replacement of synthetic rubber flexible expansion joints associated with the emergency diesel generator crankcase vacuum system during periodic maintenance. The applicant was requested either to (1) indicate if replacement of these components is based upon a qualified life or based upon condition or performance monitoring, or (2) specify the parameters that will be monitored as indicators of the components' condition or performance.

In its response to this open item, dated October 28, 2002, the applicant stated that the synthetic rubber flexible hoses on the inlet and outlet of the diesel generator crankcase vacuum blowers are inspected for cracking and signs of wear on a 6-year frequency and replaced based on condition. The staff found this to be an acceptable basis for excluding these hoses from an AMR. Therefore, open item 2.3.3.13.2-1 is closed.

Open item 2.3.3.14.2-1. The applicant did not provide sufficient information in its response to RAI 2.3.3.14-1 to enable the staff to evaluate the adequacy of its replacement of flexible hose connections associated with the emergency diesel generator fuel oil system during periodic maintenance. The applicant was requested either to (1) indicate if replacement of these components is based upon a qualified life or based upon condition or performance monitoring, or (2) specify the parameters that will be monitored as indicators of the components' condition or performance.

In its response to this open item, dated October 28, 2002, the applicant stated that the flexible hoses in the diesel generator fuel oil system are replaced on a qualified life every 6 years and, therefore, are not subject to an AMR. Since the component is replaced on a specified interval, the staff agreed with this conclusion. Therefore, open item 2.3.3.14.2-1 is closed.

Open item 2.3.3.19-1. McGuire UFSAR Section 9.5.1.2.1 states that fire hydrants are connected to the yard main. Furthermore, fire hydrants are considered passive and long-lived components in accordance with 10 CFR 54.21. Since the UFSAR is referenced in the license conditions for both McGuire and Catawba, and these components are discussed therein as providing a fire suppression function (which is required by 10 CFR 50.48), it appears that these components are required to meet the requirements of 10 CFR 50.48. The UFSAR does not distinguish between those fire hydrants that are required by 10 CFR 50.48 and those that are not. McGuire is required to meet Appendix A to BTP 9.5-1 and Catawba is required to meet the position documented in CMEB 9.5-1. Both documents state that "outside manual hose installation should be sufficient to reach any location with an effective hose stream. To accomplish this, hydrants should be installed approximately every 250 feet on the yard main system." Therefore, the applicant was requested to furnish documentation that demonstrates that the excluded fire hydrants are not required by 10 CFR 50.48 or identify these hydrants as being within the scope of license renewal and subject to an AMR.

During a meeting with the staff on October 1, 2002, and in its formal response to this open item dated October 28, 2002, the applicant stated that the fire protection plant designs for McGuire and Catawba are unique. By design, most plants rely upon the hydrants for compliance with 10 CFR 50.48 as a backup means of suppression to ensure defense-in-depth. However, the fire protection system in the auxiliary buildings for McGuire and Catawba consists of two headers that feed the automatic and manual suppression systems. These headers provide sectional isolation capability between the automatic and manual suppression systems such that a single failure cannot cause loss of water supply to both the automatic and manual means of suppression in a given area. As such, defense-in-depth exists in the fire protection system design in the auxiliary building for McGuire and Catawba. In addition, Duke stated that no potential sources of radioactive releases are protected in the event of a fire by those hydrants that are excluded from the scope of license renewal at McGuire or Catawba. Since the applicant does not rely on the hydrants as a backup means of suppression or to protect against the release of radioactive releases for compliance to 10 CFR 50.48, SER open item 2.3.3.19-1 is closed.

Open item 2.3.3.19-2. Operating license conditions for McGuire and Catawba, Supplement 2 of the McGuire and Catawba Safety Evaluation Reports (SERs) for original licensing, and Section 9.5.1.2.1 of the McGuire and Catawba UFSARs indicate that jockey pumps are provided to prevent frequent starting of the fire pumps by maintaining pressure in the yard mains in accordance with Section 6.b of BTP CMEB 9.5-1 and NFPA 20. The staff was concerned that

the applicant has misapplied the QA Condition 3 designation for license renewal scoping purposes and excluded jockey pumps from the scope of license renewal, although the licensing basis of the plants indicates that these jockey pumps are relied upon to perform a function required by 10 CFR 50.48.

In its response dated October 28, 2002, Duke identified the jockey pump casings, piping, and other components of the fire water pressure maintenance sub-system as within the scope of license renewal. The applicant also provided the AMR results for the pressure maintenance subsystem of the fire protection system containing the jockey pump. Therefore, the staff was satisfied with the resolution of this issue. Open item 2.3.3.19-2 is closed. The staff's evaluation of the AMR results for the fire water pressure maintenance sub-system is documented in Section 3.3.19.2 of this SER.

Open item 2.3.3.19-3. Duke did not identify Catawba fire suppression equipment that provides fire water to lower containment carbon filters as within the scope of license renewal. Section 9.5.1.2.1 of the UFSAR states that the interior fire water system provides a fixed water suppression system for charcoal filters. On pages 48-50 of Duke's revised response to Appendix A to BTP APCSB 9.5-1, submitted to the NRC by letter dated November 4, 1983, Duke stated that lower containment carbon filters are provided with fire suppression capability. According to NRC Inspection Report 50-369/02-05, 50-370/02-05, 50-413/02-05 and 50-414/02-05 (ADAMS Accession No. ML021280003), Duke Specification CNS-1465.00-00-0006 states that carbon filters are protected by built-in water spray systems. The staff did not believe that the applicant's distinction between charcoal and carbon filters was material.

In its response dated October 28, 2002, the applicant stated that it had performed further review and determined that the piping, sprinklers, and valve bodies associated with the Catawba reactor building charcoal filter unit sprinklers should have been identified as within the scope of license renewal and subject to aging management review. The applicant indicated that the components of this portion of the Catawba FP system were listed in Table 3.3-27 of the LRA. Since the fixed water suppression system for the charcoal filters was included in scope and subject to an AMR, the staff was satisfied with its resolution. Open item 2.3.3.19-3 is closed. The staff's evaluation of the AMR results is documented in Section 3.3.19.2 of this SER.

Open item 2.3.3.19-4. A license condition for McGuire and Catawba states that Duke Energy Corporation shall implement and maintain in effect all provisions of the approved fire protection program as described in the UFSARs for the respective facilities. Sections 9.5.1.2.1 and 9.5.1.2.2 of the UFSARs state that manual hose stations and automatic sprinkler or deluge systems are provided for the protection of the oil storage house, the oxygen and acetylene gas storage yard area, the compressed flammable gas cylinder storage area, the main turbine piping and bearings, the unit start-up and standby oil-filled power transformers, the main turbine lube oil reservoirs, the hydrogen seal oil unit, and the feedwater pump turbines. The UFSARs do not differentiate between those manual hose stations and automatic sprinklers that are required to comply with 10 CFR 50.48 and those that are not. Additionally, the regulations governing fire protection apply to more than the protection of structures and equipment relied upon for safe plant shutdown. Therefore, the applicant was requested to furnish documentation that demonstrates that the fire protection features are not required by 10 CFR 50.48 or identify

the components associated with these manual hose stations and automatic sprinkler or deluge systems as being within the scope of license renewal and subject to an AMR.

In its October 28, 2002, response to this open item, the applicant stated that separation was the only credited fire protection feature for those areas listed in the open item that are located in the yard. The staff agreed with the applicant's finding that the suppression systems in the outlying plant areas did not appear to be credited due to physical separation from surrounding buildings. In an augmented response dated November 18, 2002, the applicant stated that, although it disagreed with the staff's position with respect to manual hose stations in the turbine buildings, the equipment associated with these fire suppression features would be included in the scope of license renewal. The applicant also provided AMR results tables for the passive equipment brought into the scope of license renewal. Therefore, open item 2.3.3.19-4 is resolved. The staff's evaluation of the AMR results is documented in Section 3.3.19.2.

Open item 2.3.3.19-5. The staff agreed with the applicant that the strainers perform an intended function that meets one of the scoping criteria, specifically 10 CFR 54.4(a)(3). The staff's technical concern is that Duke uses lake water to supply their fire protection suppression systems at McGuire and Catawba. Lake water is corrosive and may contain sediment, which can potentially clog the fire pumps. In addition, the strainers keep debris from plugging the sprinkler nozzles in fire suppression systems in the event that sprinklers are actuated. This FP component should be managed in an AMP. However, the staff was concerned that the strainers were inappropriately screened out. Although the strainers may be in-line with and connected to the main fire pump, their function is passive (as is the pump casing's function). Since the applicant included the pump casings within the scope of license renewal, the staff believed that the strainers also should be within scope.

In its response dated October 28, 2002, the applicant stated that it had performed an AMR for the main fire pump strainers and provided the results of its review. These AMR results for the strainers were generically applicable to both McGuire and Catawba. The applicant indicated that each pump has a strainer that is within the scope of license renewal and is subject to AMR because it is a long-lived, passive component. This staff was satisfied with the resolution of this issue. Open item 2.3.3.19-5 is closed. The staff's evaluation of the AMR results is documented in Section 3.3.19.2 of this SER.

New open Item 2.3.3.19-6. 10 CFR 50.48 requires each operating nuclear station to have a fire protection plan. A license condition for McGuire and Catawba states that Duke Energy Corporation shall implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR for the respective facilities. Section 9.5.1.2.3, "Fire Protection, Category I Safety Related," of the McGuire UFSAR states that the manually operated water spray systems provide fixed spray patterns of water for Reactor Building Purge Exhaust Filters 1A, 1B, 2A and 2B. However, drawing MCFD 1599-02.01, coordinates H-3, G-3, C-5 and B-7, indicates that piping and sprinklers associated with this function are also excluded from scope. The staff was concerned that the manually operated water spray systems for these filters were inappropriately excluded from the scope of license renewal and an AMR.

In its response dated October 28, 2002, the applicant stated that the flexible hoses, piping, sprinklers, and valve bodies associated with the McGuire reactor building exhaust filters spray system should have been identified as within the scope of license renewal and subject to aging

management review. The components of this portion of the McGuire FP system are listed in Table 3.3-26 of the LRA. The staff was satisfied with the resolution of this issue. Open item 2.3.3.19-6 is closed. The staff's evaluation of the AMR results provided in Table 3.3-26 of the LRA is documented in Section 3.3.19.2 of this SER.

Open item 2.3.3.35.2-1. The applicant did not provide sufficient information in its response to RAI 2.3.3.35-3 to enable the staff to evaluate the adequacy of its replacement of flexible hose connections associated with the standby shutdown diesel generator fuel oil sub-system during periodic maintenance. The applicant should indicate if replacement of these components is based upon a qualified life or based upon condition or performance monitoring. If replacement is based upon the latter, the applicant should specify the parameters that will be monitored as indicators of the components' condition or performance.

In its response to this open item, dated October 28, 2002, the applicant stated that the flexible hoses in the standby shutdown diesel generator fuel oil subsystem are inspected for cracking and signs of wear on an 18-month frequency and replaced based on condition. The staff found this to be an acceptable basis for excluding these hoses from an AMR. Therefore, open item 2.3.3.35.2-1 is closed.

Open item 2.5-1. By letter dated June 26, 2002, the applicant provided AMR results for the passive, long-lived structures and components associated with the offsite power path. Pending completion of the staff's review of this information, this item was characterized as open.

In its June 26, 2002, letter, the applicant indicated that the following passive component commodity groups (that were originally identified as out of scope) have been identified as being within the scope of license renewal and subject to an AMR: high-voltage insulators, phase bus (e.g., isolated-phase bus, nonsegregated-phase bus, bus duct), switchyard bus, and transmission conductors. In a letter dated October 2, 2002, the applicant clarified its response to SER open item 2.5-1, stating that all insulated cables and connections (power, control, and instrumentation applications) installed in the additional areas identified in the SBO open item response were, and still are, in scope as part of a bounding scope. The applicant also provided, in a letter dated October 28, 2002, a simplified one-line diagram of the SBO power recovery path and further clarified that insulated cables and connections included as part of the SBO power recovery path are considered to be part of the larger component commodity group, which includes all insulated cables and connections. Cables and connections in the SBO power recovery path were considered by the applicant to be within the scope of license renewal and subject to an AMR. Since the long-lived, passive component associated with the offsite power path for recovery from SBO events was included within the scope of license renewal in accordance with 10 CFR 54.4(a)(3), open item 2.5-1 is closed.

New open item 3.0.3.2.3-1. The applicant provided in Appendix A-1 (McGuire) and A-2 (Catawba) new FSAR sections describing the chemistry control program. The information provided for the FSAR is consistent with the program described in Appendix B; however, the applicant should include a discussion in the FSAR supplement regarding the specific technical specifications and the EPRI guidelines that are mentioned in Appendix B for the Chemistry Control Program.

In its response dated October 28, 2002, the applicant added references to improved technical specifications (ITS) 5.5.10 and 5.5.13 (for McGuire and Catawba) and SLC requirements

(16.5-7, 16.8-3 and 16.9-7 for McGuire, and 16.5-3, 16.7-9 and 16.8-5 for Catawba). The applicant also augmented its McGuire and Catawba FSAR supplements to indicate that the Chemistry Control Program contains system-specific acceptance criteria that are based on the guidance provided in EPRI PWR Primary Water Chemistry Guidance, EPRI PWR Secondary Water Chemistry Guidelines, and EPRI Closed Cooling Water Chemistry Guidelines. The staff found that the revised FSAR supplement is consistent with the program described in Appendix B of the LRA and considers open item 3.0.3.2.3-1 closed.

New open item 3.0.3.9.1.2(a-g). The applicant's acceptance criteria for heat exchanger preventive maintenance are not adequate to provide the staff with reasonable assurance that loss of material of the heat exchanger components will be adequately managed or monitored such that the intended functions of the heat exchangers will be maintained during the extended period of operation. This open item applies to seven aging management activities (a through f).

In its response to SER open item 3.0.3.9.1.2(a), dated October 28, 2002, the applicant indicated that these heat exchanger tubes are a coil design and, therefore, are not candidates for eddy current testing. As indicated in Section B.3.17.6 of the LRA, either destructive or non-destructive examination will be performed to examine the internal surfaces of the tubes. If evidence of loss of material is observed during the initial inspection, a problem report will be initiated in accordance with the problem investigation process defined in Nuclear System Directive 208. The problem investigation process is a formalized process for documenting engineering evaluations of plant problems that would include the assessment of the severity of the observed degradation, the need for corrective actions, the need for further inspections of other locations, and the need for future inspections or programmatic oversight. Criteria such as ASME Code requirements, additional inspection results, and operating experience may be used to assess the severity of the degradation and the need for corrective actions. Any criteria or analysis methods involved in determining the severity of the degradation and the need for corrective action will be developed at the time of the evaluation and will be a part of the problem report. Since the applicant indicated that it would consider the ASME Code (which is endorsed by the staff through 10 CFR 50.55a) and other pertinent factors in determining the acceptance criteria for loss of material, the staff found the applicant's response to SER open item acceptable. Therefore, open item 3.0.3.9.1.2 (a) is closed.

In its response to SER open item 3.0.3.9.1.2(b-g), dated October 28, 2002, the applicant indicated that criteria such as ASME Code requirements, additional inspection results, and operating experience may be used to assess the severity of the degradation and the need for corrective actions. The applicant further explained that eddy current testing at McGuire and Catawba is performed by a vendor who specializes in the practice, and that a four-step process is used to determine if test results are acceptable and generate the final test report. This process was described in detail in the applicant's October 28, 2002, response to this SER open item. The staff found that appropriate and adequate acceptance criteria for detecting heat exchanger tube degradation from loss of material were identified for these aging management programs. Therefore, open items 3.0.3.9.1.2 (b-g) are closed.

New open item 3.0.3.10.2-1. Since volumetric examination techniques provide a demonstrated capability and a proven industry record to permit detection and sizing of significant cracking and flaws in piping weld and base material, the staff believed that volumetric examination of a sample of small-bore Class-1 piping was needed to demonstrate that the effects of aging are being adequately managed during the period of extended operation. The staff also believed

that a sample of affected welds selected for inspection should be based upon piping geometry, pipe size and flow conditions, and that the inspection should be performed by qualified personnel using approved station procedures.

In its response dated November 14, 2002, the applicant stated a set of susceptible small bore piping locations will be volumetrically examined on each unit. Locations to be examined will be determined based on consideration of damage mechanisms. Damage mechanisms to be considered include fatigue, stress corrosion, and flow assisted corrosion/flow wastage. Cracking due to thermal fatigue resulting from stratification of fluids and turbulent penetration flow is an aging effect that also will be addressed. The applicant further indicated that the Small Bore Piping Examination will be an activity within the Inservice Inspection Plan during the period of extended operation. Small Bore Piping Examinations will be performed during each inservice inspection interval during the period of extended operation. By letter dated November 21, 2002, the applicant augmented its response to clarify how the Small Bore Piping Examination will be implemented at McGuire and Catawba. The applicant stated that it will first determine the population of Duke Class A piping that is less than 4-inch NPS for the unit to be inspected. This population of piping will then be reviewed by experienced engineers to determine the more likely locations that could be impacted by the various damage mechanisms described in Duke's November 14, 2002, response to this open item. The determination will involve a review of the physical plant design such as piping layout, geometry and operating temperatures, as well as both plant and industry operating experience that could indicate more optimum inspection locations. The set of locations selected will comprise the scope of the Small Bore Piping Examination and will be identified within the Inservice Inspection Plan for each station. Since volumetric inspection will ensure that the inspections of the small bore piping components will be capable of detecting cracking in the components, the staff considers SER open item 3.0.3.10.2-1 closed.

New open item 3.0.3.10.2-2. In October 2000, a through-wall crack was identified in the reactor vessel hot leg piping at V.C. Summer. Specifically, the crack was located in the first weld between the reactor vessel nozzle and the "A" loop hot leg piping, approximately 3 feet from the reactor vessel and 7 degrees clockwise from the top dead center of the weld (as viewed from the centerline of the reactor vessel). The weld was fabricated from Alloy 82/182 material. The failure mode was determined to be primary water stress corrosion cracking and the root cause of the cracking was attributed to the presence of high residual stresses resulting from extensive repairs of the subject weld. The staff requested the applicant to identify the locations in the McGuire and Catawba RCS piping that contain welds fabricated from Alloy 82/182 material. Additionally, the staff requested the applicant to describe the actions it plans to take to address this operating experience as it applies to McGuire and Catawba.

In its response to open item 3.0.3.10.2-2, dated October 28, 2002, the applicant specified the McGuire and Catawba reactor coolant system piping that contains welds fabricated from Alloy 82/182 material, and the applicant described the actions it has taken, and will take in the future, to address this operating experience as it applies to McGuire and Catawba. The applicant further stated that the applicable V.C. Summer hot leg safe-end weld was fabricated using a field weld process and was not machined to a smooth bore nozzle configuration as was the case for the corresponding welds at McGuire 1 and 2 and Catawba 1 and 2. The applicant stated that UT examination methods cannot provide accurate results when good contact is not maintained between the UT probe and the weld surface during the examination. The applicant stated that the irregular weld surface at V.C. Summer was the contributing factor for the inability

of the UT inspections to provide relevant inspection results. In contrast, the applicant noted that the corresponding welds at McGuire and Catawba were machined to smooth surfaces.

The staff notes that, although the smooth surfaces for McGuire and Catawba welds, described in the applicant's response, may improve the quality of UT examinations, they alone do not ensure that completely accurate, reliable UT examination results can be obtained. The staff is also currently assessing whether the automated UT inspection techniques developed by the EPRI Materials Reliability Project (MRP) Alloy 600 ITG, Alloy 82/182 Weld Integrity Inspection Committee (including those developed by Framatome Technologies, Inc., on behalf of the Alloy 82/182 Weld Integrity Committee) are acceptable methods for detecting PWSCC in RCS hot-leg nozzle safe-end welds fabricated from Alloy 82/182 weld materials. Therefore, the staff still considers PWSCC of the weld material to be a potential aging effect for the McGuire and Catawba RCS pipe welds identified in the applicant's response to SER open item 3.0.3.10.2-2.

The staff is assessing the generic applicability of this current operating issue and is pursuing its resolution pursuant to 10 CFR Part 50. Any required activities associated with its resolution (still under review) will be implemented by the applicant during the current operating term to ensure that the integrity of the Class 1 safe-end welds will be maintained consistent with the CLB before the period of extended operation begins. Thus, pursuant to 10 CFR 54.30, the V.C. Summer issue, as it relates to the structural integrity of the McGuire and Catawba hot-leg nozzle safe-end welds, is outside the scope of the license renewal review. Since the applicant provided the information requested in SER open item 3.0.3.10.2-2 (locations of 82/182 weld material in the RCS piping and activities to address the V.C. Summer operating experience), and since, pursuant to 10 CFR 54.30, the V.C. Summer hot leg cracking event is beyond the scope of the staff's license renewal review, open item 3.0.3.10.2-2 is closed.

New open item 3.0.3.11.3-1. The FSAR supplements did not include references to several of the important industry codes and standards discussed in the applicant's March 11, 2002, response to the staff's RAIs on the Inspection Program for Civil Engineering Structures and Components. The staff requested the applicant to submit an updated summary description of the program to reflect these codes and standards.

In its response dated October 2, 2002, the applicant provided an update of the FSAR supplements for McGuire and Catawba. These updates included references to NRC Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," and ACI 349.3, "Evaluation of Existing Nuclear Safety-Related Concrete Structures," which were included in the applicant's response to RAI B.3.21-2. Therefore, open item 3.0.3.11.3-1 is closed.

New open item 3.0.3.13.2-1. In the case of the buried piping, the staff finds the applicant's Preventive Maintenance Activities - Condenser Circulating Water System Internal Coating Inspection program ineffective at revealing degradation of the external pipe surface before the component pressure boundary is breached and leakage occurs. The staff believed that the applicant should propose an activity to verify that the external surfaces of buried components are not degrading based upon some sampling assessment of the most vulnerable locations.

After the SER with open items was issued, the staff reconsidered its assessment of the proposed program. In an electronic correspondence dated September 23, 2002, the staff notified the applicant that open item 3.0.3.13.2-1 was considered resolved. Corrosion of the

outside surface of a buried pipe occurs at locations where the coating is damaged. Since this can happen anywhere along the pipe, the whole length of the pipe would need to be excavated to obtain meaningful information. However, this is not practical. If a leak develops due to corrosion of the outside of a pipe (due to damage of the outside coating), the inside coating would also exhibit signs of damage. Therefore, inspection of the inside coating will reveal the location of the leak. The degree of degradation of the inside coating can give some idea of the condition of the outside coating. Since the sample of internal pipe at McGuire and Catawba to be inspected consists of about 90 percent of the population of piping governed by the Condenser Circulating Water System Internal Coating Inspection program, this significant sample size should yield valid, reliable results with a high degree of confidence. Additionally, the staff found a similar inspection program for Oconee acceptable. Therefore, open item 3.0.3.13.2-1 is considered closed.

New open item 3.0.3.15.2-1. In its description of the Service Water Piping Corrosion program, Monitoring and Trending element, the applicant stated that localized corrosion due to pitting and MIC will reveal itself through pinhole leaks in the piping components, that they are not a structural integrity concern, and that they cannot individually lead to loss of the component's intended function, since sufficient flow at prescribed pressures can still be provided by the system. The applicant also stated that these localized concerns will lead to structural integrity concerns only when a significant number of pinholes are present and that a trend of indications of through-wall leaks will trigger corrective actions. However, the staff believed that localized corrosion can result in the loss of the intended function to maintain pressure boundary under a design basis event before the corrosion reveals itself as pinhole leaks. Therefore, the applicant was requested to justify how its program will manage the effects of localized corrosion from pitting and MIC to ensure that the intended pressure boundary function can be maintained under all design basis events consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(3).

In its response dated October 28, 2002, the applicant provided a more detailed description of its program for inspecting piping in the service water system. The program utilizes ultrasonic technology to look for loss of material. The periodic ultrasonic testing (UT) identifies any potential areas of severe degradation by corrosion that could exceed the ability of piping to maintain its structural integrity. Although the primary issue addressed by the program is gross wall loss, which could lead to structural instability, the program also includes the areas containing localized corrosion by pitting and other localized corrosion mechanisms. This was required because localized corrosion may become a structural concern when a significant number of pinholes are present in a one area. When an occurrence of localized corrosion is identified either by UT or a pinhole leak, an evaluation is performed to justify structural integrity of the inspected component under all design conditions. This ensures that the service water corrosion program addresses localized corrosion affecting structural integrity of the affected components before it is revealed as a pinhole leak. In order to achieve this, the program was designed to perform appropriate inspections, evaluations, and trending and taking appropriate corrective actions. The staff found that, by following this process, the applicant will be able to detect the effects of localized corrosion from pitting and MIC before structural integrity of the piping is jeopardized. Therefore, open item 3.0.3.15.2-1 is closed.

New open item 3.0.3.18.3-1. The FSAR supplements did not include references to some important industry standards and the NRC guidelines used for the Underwater Inspection of

Nuclear Service Water Structures program. The staff requested that the applicant revise its FSAR supplements for McGuire and Catawba to reflect these standards and guidelines.

In its response dated October 2, 2002, the applicant provided a revised FSAR supplement that included the appropriate industry standards. The staff found that the revised FSAR supplement provides a summary description of the program at a level of detail commensurate with that which is provided in the staff's review guidance (Appendix A of NUREG-1800) and is, therefore, acceptable. Therefore, open item 3.0.3.18.3-1 is resolved.

New open item 3.1.2.2.2-1. Under the Monitoring and Trending element of the Pressurizer Spray Head Examination, the applicant stated that a visual examination (VT-3) would be performed, and that no actions are taken as part of this program to trend inspection or test results. However, the staff's position is that VT-3 examinations may not be capable of detecting cracks that may occur in the pressurizer spray head. The staff therefore requested that the applicant amend the Pressurizer Spray Head Examination to state that VT-1 examination methods, which are capable of detecting and resolving cracks in the pressurizer spray heads, will be used for the one-time inspection. The scope of this open item included the potential need to revise the acceptance criteria for this program and the FSAR supplement summary description.

In its response to open item 3.1.2.2.2.-1, dated October 28, 2002, the applicant stated that the visual inspection method for the pressurizer spray head examination will be revised to VT-1 examination methods, and that the acceptance criteria will be in accordance with those specified for VT-1 examinations in Section XI of the ASME Boiler and Pressure Vessel Code. The applicant also stated that these changes will be reflected in a revision of the UFSAR supplement. The applicant's response indicated that the applicant will implement a visual examination method for the pressurizer spray head examination that is capable of detecting surface cracks in the spray head material, and that any cracks detected by the examination will be evaluated using established Section XI acceptance criteria. This meets the criteria in Section XI of the ASME Code for performing visual examinations of Code Class components for cracking and resolves the issue raised in open item 3.1.2.2.2-1. Therefore, the staff considers open item 3.1.2.2.2.-1 to be closed.

New open item 3.1.3.2.2-1. The staff reviewed the surveillance capsule schedules in Tables B.3.26-1 and B.3.26-2 of the LRA. For McGuire 1, capsule "W" is a standby capsule and would be withdrawn at a fluence that is significantly above the equivalent of 60 years. The staff was concerned that the applicant would need to remove this capsule and place it in storage to prevent further exposure and preserve its ability to provide meaningful metallurgical data. For Catawba 2, the staff was concerned that capsule "U" (a standby capsule) would need to be inserted in the reactor vessel and begin to accumulate fluences in an operating environment for data collection purposes. The staff believed that the applicant should place all pulled capsules in storage so that they may be saved for future use. In addition, the staff believed that, after the applicant has pulled all the capsules, it should use alternative dosimetry to monitor neutron fluence during the period of extended operation. The staff requested the applicant to describe its plans for this capsule.

In its response to open item 3.1.3.2.2-1, dated October 28, 2002, the applicant identified those surveillance capsules that are in storage and those that are available for further testing if necessary. The applicant discussed its RV material surveillance programs for McGuire and

Catawba and clarified its plans for removal and testing of surveillance capsule W (for McGuire 1) and surveillance capsule U (for Catawba 2). The staff concluded that the surveillance program is acceptable for the period of extended operation for all units and considers open item 3.1.3.2.2-1 closed.

New open item 3.1.3.2.2-2. The staff and nuclear power industry are pursuing resolution of the reactor vessel penetration nozzle cracking issue and the Davis Besse reactor vessel head wastage issue identified in October 2000. The staff is evaluating potential changes to the requirements governing inspections of Alloy 600 vessel head penetration (VHP) nozzles, PWR upper RV heads, and other RCS piping and components (specifically with respect to non-destructive examinations and the ability to detect cracking in the VHP nozzles and loss of material due to boric acid corrosion). These are emerging, current license issues that have not yet been resolved and, pursuant to 10 CFR 54.30(b), are beyond the scope of this license renewal review. However, since these issues might not be resolved prior to issuance of the renewed operating licenses for the McGuire and Catawba units, the staff requested the applicant to commit to implementing any actions, as part of the VHP Nozzle Program, that are agreed upon between the NRC, the NEI, Materials Reliability Project (MRP), and the nuclear power industry to monitor for, detect, evaluate, and correct cracking in the VHP nozzles of U.S. PWRs, specifically as the actions relate to ensuring the integrity of VHP nozzles in the McGuire and Catawba upper RV heads during the extended period of operation. This commitment will ensure that the applicant's VHP Nozzle Program (as described in the McGuire and Catawba UFSARs) will be capable of monitoring for, detecting, evaluating, and correcting cracking in the McGuire and Catawba VHP nozzles and associated upper RV heads before unacceptable degradation of the VHP nozzles or associated upper RV heads occurs. Any updates to the VHP Nozzle Program that result from resolution of this issue should be reflected in the McGuire and Catawba UFSARs.

In its response dated October 28, 2002, the applicant provided revised FSAR supplement summary descriptions of the VHP Nozzle Program and the Alloy 600 Review to indicate that these programs will be revised as necessary to reflect any new or revised commitments made by Duke in response to staff generic communications. The commitment to incorporate resolution of this current operating issue into the VHP Nozzle Program and the Alloy 600 Review, as stated in the revised FSAR supplements, ensures that the methods implemented by the applicant for inspecting the McGuire and Catawba VHP nozzles and RV heads will be sufficient to detect PWSCC in the VHP nozzles. Therefore, the staff found that there was reasonable assurance that the applicant has demonstrated that the effects of aging associated with the VHP Nozzle Program and the Alloy 600 Review will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff considers open item 3.1.3.2.2-2 closed. With respect to boric acid corrosion, the staff is continuing to gather information on industry programs to determine what, if any, regulatory action is needed.

New open item 3.1.4-1(a). Since the fabricator for the McGuire 1 and Catawba 2 RVs is not the same as the design fabricators for McGuire 2 and Catawba 1 RVs or for the Oconee RVs, some uncertainty exists whether the inspections of welded RV internals at Oconee 1 and McGuire 1 will be truly representative of the condition of welded RV internals at McGuire 2 and the Catawba units. The staff believed that the applicant should schedule inspections of remaining RV internal plates, forgings, welds and bolts (i.e., core barrel bolts and thermal shield bolts) at all of the McGuire and Catawba reactor units.

In its response to open item 3.1.4-1(a), dated October 28, 2002, the applicant clarified that all of the RV internals for the McGuire and Catawba units were manufactured by Westinghouse, not by the fabricators of the RVs (i.e., neither Combustion Engineering nor Rotterdam Drydock fabricated the RV internals). The applicant provided an acceptable design-feature-based argument for concluding the baffle bolts and plates at McGuire were limiting in regard to the temperatures and fluences the materials would achieve when compared to those in the Catawba units, and stated that it would inspect the RV internals at both McGuire 1 and McGuire 2 during the periods of extended operation for the units and to use the results of the examinations as the basis for determining whether additional inspections of the RV internals at Catawba 1 and Catawba 2 would be necessary. The applicant stated that the RV internals at McGuire 1 will be inspected during the fifth ISI interval for the unit, and the RV internals at McGuire 2 will be inspected during the sixth ISI interval for the unit. Based on this response, the applicant will be performing inspections of the RV internals at five of the seven Duke-owned nuclear reactors (i.e., at Oconee and McGuire). Since the McGuire RV internals are projected to be limiting in comparison to those at Catawba, the staff concluded that the applicant's credited inspections for the RV internal core barrel components at McGuire (and at Oconee) will provide an acceptable basis for determining whether age-related degradation is applicable in the corresponding components at Catawba and for scheduling inspections at Catawba as necessary. This resolves open item 3.1.4-1(a).

New open item 3.1.4-1(b). The critical crack size acceptance criterion for RV internal forgings, plates, and welds, and RV internals made from CASS had not yet been established. Nor had any acceptance criteria been proposed for the inspections that might be proposed to monitor the RV internals for void swelling. The applicant will need to submit the critical crack size acceptance criteria for the RV internal forgings, plates, and welds, and RV internals made from CASS once the evaluations for these components have been completed and the critical crack sizes for these components have been established. Once the applicant has finalized its evaluation of void swelling of the RV internals, the applicant will also need to submit the acceptance criteria for dimensional changes that might result in the RV internal components as a result of void swelling. The staff requested a commitment from the staff to determine the critical crack size and submit this acceptance criterion (when it has been determined) to the staff.

In its response to open item 3.1.4-1(b), dated October 28, 2002, the applicant provided a summary description of the Acceptance Criteria attribute of the Reactor Vessel Internals Inspection for each station's FSAR supplement to address the need to submit the acceptance criteria established by industry programs for evaluating cracking, loss of fracture toughness, and void swelling in Westinghouse-designed RV internals to the staff for review and approval. This is acceptable to the staff, since the industry is currently in the progress of establishing what the techniques and acceptance criteria will be for evaluation of these aging effects in Westinghouse-designed RV internals. This resolves open item 3.1.4-1(b).

New open item 3.1.4-1(c). The staff requested the applicant to provide a commitment to update the "Detection of Aging Effects" program attribute in FSAR Supplement Section 18.2.22, "Reactor Vessel Internals Inspection," to reflect the second paragraph in the applicant's response to RAI B.27-2. This part of open item 3.1.4-1 was not identified in the SER with open items. For tracking purposes, the staff and applicant characterized this issue as SER open item 3.1.4-1(c).

In its response to open item 3.1.4-1(c), dated October 28, 2002, the applicant stated that the FSAR supplements for McGuire and Catawba will be revised to incorporate a statement that the visual inspection method selected for the inspection of RV internal plates, forging, and welds will be sufficient to detect cracks in the components prior to any growth to a size that is greater than the critical crack size (critical crack length) for the material. In its response, the applicant acknowledged that, for visual inspections of RV internals at McGuire and Catawba, it must implement a visual inspection technique that is capable of detecting surface cracks in the internal components. This acknowledgment resolves open item 3.1.4-1(c).

New open item 3.1.5-1. The staff requested the applicant to include a reference to NEI 97-06 in a summary description of the Steam Generator Surveillance Program or in Table 18-1 of the McGuire and Catawba FSAR supplements.

In its response dated October 28, 2002, the applicant provided a modified FSAR supplement summary description of this program. The revised FSAR supplement included a statement that inspections of the steam generator surveillance program follow the recommendations of NEI 97-06, "Steam Generator Program Guidelines." The staff found the changes acceptable because the modified FSAR supplement summary description will be consistent with the steam generator surveillance program described in Appendix B, Section B.3.31, of the Catawba and McGuire LRA. The staff considers open item 3.1.5-1 closed.

New open item 3.3.6.2.1-1. In its response to RAI 2.3.3.6-6, the applicant provided the AMR results for condenser circulating water system expansion joints at Catawba. The material for these expansion joints was specified as synthetic rubber coated with chlorobutyl rubber; the environment was specified as the yard. The applicant did not identify any aging effects; nor did the applicant specify any AMP for these components. However, the staff concluded that exposure of these expansion joints to ultraviolet (UV) rays could cause degradation over time. Because the applicant's description of the yard environment in the LRA did not address sun exposure, the staff was unable to verify that there are no applicable aging effects for these components. The applicant was requested to submit a more detailed description of the yard environment for the condenser circulating water system expansion joints to address UV exposure.

In its response dated November 14, 2002, the applicant agreed to add cracking and wear as potential aging effects and addressed the issue of potential degradation of the synthetic rubber expansion joint in the condenser circulating water system. The applicant stated that it would implement a one-time inspection of the expansion joints in order to characterize any cracking and wear of expansion joints exposed to raw water internal and the yard external environments. The applicant stated that, based on current operating experience, one-time inspection of the expansion joints will be adequate for protecting the system. The staff reviewed the AMR results and concluded that the aging effects specified for the expansion joint were consistent with industry experience for these combinations of materials and environments. The staff also evaluated the one-time inspection credited for these components and found that there was reasonable assurance that the applicant had demonstrated that the effects of aging associated with the one-time inspection of the expansion joints in the condenser circulating water system program will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). Therefore, the staff considers open item 3.3.6.2.1-1 resolved.

New open item 3.3.17.2.1-1. In its response to RAI 2.3.3.17-2, the applicant provided the AMR results for a carbon steel emergency diesel generator starting air distributor filter in a sheltered environment. The applicant indicated that no aging effects were identified for this component. However, the staff noted that this conclusion was not consistent with the applicant's treatment of other carbon steel components in a sheltered (moist air) environment that are listed in Table 3.3-23, "Aging Management Review Results - Diesel Generator Starting Air System (McGuire Nuclear Station)." The applicant was requested to explain why the carbon steel emergency diesel generator starting air distributor filter in a sheltered environment is not subject to loss of material or to identify this aging effect and an AMP to manage or monitor the associated loss of material.

In its response dated October 28, 2002, the applicant provided a revised AMR results table for the diesel generator starting air distributor filter. The applicant specified loss of material as an aging effect and credited the Inspection Program for Civil Engineering Structures and Components. The aging effect specified is consistent with industry experience for the material and environment specified. Therefore, this response is acceptable to the staff and resolves open item 3.3.17.2.1-1.

Open item 3.3.35.2-1. The staff requested additional information pertaining to Table 3.3-44, "Aging Management Review Results - Standby Shutdown Diesel Generator." This table indicates that the cooling water and jacket water engine radiator heat exchanger has a heat transfer function that is managed by the Chemistry Control Program. Heat transfer monitoring is not identified as a capability of the Chemistry Control Program, as defined in Appendix B, Section B.3.6. The applicant was requested to explain how the Chemistry Control Program monitors the heat transfer function. In its response, the applicant stated that for the heat exchangers in the standby shutdown diesel generator cooling water and jacket water heating sub-system, fouling would not occur because there is constant flow through the heat exchangers and because the treated water in the system is filtered to remove particles. Therefore, no aging management program is required. The staff did not agree with the applicant's conclusion that fouling will not occur in the heat exchanger because of the constant flow through the heat exchanger. The staff recognized that sufficient flow through the heat exchanger may prevent areas of stagnation in which fouling may occur. However, the applicant had not substantiated its conclusion with any operating experience, such as maintenance and surveillance results, to demonstrate the success of this activity in preventing fouling. With respect to the filtering of the treated water to remove particles, the staff recognized that particulates are removed through a filtering process. However, the applicant did not list or credit a periodic surveillance of the filter to ensure that the entrained particles do not create a high differential pressure and adversely affect flow through the heat exchanger.

In its response dated October 28, 2002, the applicant identified fouling due to silting as an aging effect requiring management for the heat exchanger in the standby shutdown diesel cooling water and jacket water heating subsystem. The applicant further clarified that the standby shutdown diesel cooling water and jacket water heating subsystems are closed cooling water systems treated with corrosion inhibitors. The Chemistry Control Program was credited for managing fouling. The staff found that the clarifications and changes provided by the applicant are appropriate to ensure that the aging effects associated with the heat exchanger in the standby shutdown diesel cooling water and jacket water heating subsystem will be adequately managed during the period of extended operation. The identification of fouling as an aging effect and its management through corrosion inhibitors monitored by the Chemistry

Control Program were acceptable because the program precludes the formation of corrosion products that can cause the fouling of the heat exchanger and adversely impact the heat transfer function. Therefore, open item 3.3.35.2-1 is closed.

New open item 3.4.1.2.2-1. The applicant proposed to mitigate general corrosion and loss of material of the auxiliary feedwater system carbon steel piping components by chemistry control. However, the staff believed that the effectiveness of the Chemistry Control Program should be verified by implementing a one-time inspection of the internal surfaces of these components.

In its response dated October 28, 2002, the applicant stated that it had searched the operating experience database to determine if there had been any component failures, relevant industry operating experience, or problems discovered during routine maintenance and testing. The applicant did not find any loss of the intended functions of the auxiliary feedwater system components that could be attributed to the inadequacy of the chemistry control program. The applicant stated that routine maintenance of other secondary system components, such as the steam generators and main turbine, provides additional operating experience because they do operate during startup and shutdown and are of the same chemistry as the feedwater system and other secondary side systems. These secondary systems have also shown no degradation affected by water chemistry. However, the applicant added a statement to Section 18.3 of the McGuire and Catawba FSAR supplements to indicate that visual inspections of the interior surfaces of auxiliary feedwater system and main feedwater system components and piping will be performed when available, and that the inspection results will be documented in writing and available for inspection following issuance of renewed operating licenses for McGuire and Catawba. The staff finds the augmented Catawba and McGuire FSAR supplements acceptable because the applicant will inspect these internal surfaces specifically for aging effects (loss of material) and will document its findings in the inspection procedure. This deliberate inspection will provide an opportunity to verify that the Chemistry Control Program is effective and thereby satisfies the intent of the one-time inspection. The staff considers open item 3.4.1.2.2-1 closed.

Open item 3.5-1. Contrary to the applicant's claim that aging management of concrete components via periodic inspections is only necessary for concrete SCs that are exposed to harsh environments, the staff's position is that both the operating and environmental conditions, as well as the aging of concrete nuclear components, are subject to change throughout the period of extended operation. Therefore, the staff believed the applicant should periodically inspect these components. Although the applicant had performed an aging management review pursuant to 10 CFR 54.21(a)(3) for each structure and component that was determined to be in the scope of license renewal, the staff's position (issued by letters dated November 23, 2001, and April 5, 2002, is that aging management reviews should be used to differentiate between those components requiring only periodic inspections and those requiring further evaluation. Aging management review results of concrete structures and components may also be used to establish different scheduled inspection frequencies, similar to those recommended by American Concrete Institute 349.3R, for aging management programs. The staff was concerned that the applicant had not proposed periodic inspections of concrete components during the period of extended operation. Therefore, the staff was unable to make a reasonable assurance finding that in-scope concrete structures and components would maintain their structural integrity and intended functions.

In its response dated October 2, 2002, the applicant agreed to resolve open item 3.5-1 by committing to manage the aging of accessible concrete structural components during the period

of extended operation. In a letter dated October 28, 2002, the applicant submitted revised AMR results tables for Section 3.5 of its LRA. In a letter dated November 14, 2002, the applicant state that it would manage loss of material, cracking, and change in material properties for the accessible concrete components identified in Tables 3.5-1 and 3.5-2 of the LRA. The applicant credited the Inspection Program for Civil Engineering Structures and Components to manage the specified aging effects. The applicant's periodic inspection of accessible concrete structures and components through its Inspection Program for Civil Engineering Structures and Components is acceptable to the staff. Therefore, open item 3.5-1 is closed.

Open item 3.5-2. The staff expressed concern that the applicant did not plan to periodically monitor groundwater during the extended period of operation to confirm that it is not aggressive to buried portions of concrete structures. As stated in the applicant's response to RAI 3.5.1, the chloride, sulfate, and pH values over the past 20 to 30 years are well below the limits where potential degradation of concrete may occur. In addition, the water contour tables for both Catawba and McGuire show that the water table levels decrease from the two nuclear stations outward to the surrounding areas such that only a chemical event at the nuclear stations would potentially impact their respective site environments, including the groundwater. However, in its response to RAI 3.5-1, the applicant did not commit to initiate corrective action in the event of a potential change to the site environment resulting from a chemical release during the period of extended operation. Such a corrective action would need to include a commitment to monitor the groundwater chemistry and to assess the potential impact of any changes to the groundwater chemistry on below-grade concrete components.

In a letter dated July 9, 2002, the applicant stated that it did not commit to initiate a corrective action in the event of a potential change to the site environment resulting from a chemical release during the period of extended operation, because such an event was not postulated. The applicant stated that it was not credible to postulate that some environmental event will occur in the future that would affect the quality of groundwater in the vicinity of Catawba or McGuire. A change in the environment due to a chemical release would be an abnormal event. The staff reviewed NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," and determined that aging effects from abnormal events need not be postulated specifically for license renewal. After the SER was issued with this identified as open item 3.5-2, the staff reviewed the guidance provided in NUREG-1800 and reconsidered the applicant's assertion that a potential change to the site environment resulting from a chemical release during the period of extended operation would be an abnormal event. The staff agreed that such a chemical release would not need to be postulated for the purposes of performing an aging management review for license renewal. Therefore, the staff closed open item 3.5-2 without any further information from the applicant. The applicant was notified of this resolution by electronic correspondence dated September 3, 2002.

Open item 3.5-3. Since the ice condenser wear slab, structural concrete floor, and crane wall were characterized as inaccessible and in a unique environment of low humidity and temperature, the staff acknowledged that there are no accessible concrete components in a similar environment that the applicant could use as an indicator of the aging of these inaccessible ice condenser components. However, the applicant indicated in its response to RAI 3.5-6 that portions of both the structural concrete floor, which is located beneath the ice condenser wear slab, and the crane wall are accessible for inspection. Specifically, the applicant stated that the structural concrete floor is accessible from below, and that the interior surface of the crane wall is open to the reactor building environment and accessible for

inspection. For the ice condenser wear slab, the applicant indicated that a protective layer of ice would prevent water from coming into contact with the wear slab. Since the applicant did not plan to inspect potentially accessible portions of the ice condenser crane wall or accessible portions of the ice condenser structural concrete floor, the staff could not conclude, with reasonable assurance, that these concrete structures would be adequately monitored to ensure that their intended functions will be maintained during the extended period of operation.

In its response to open item 3.5-3, dated October 2, 2002, the applicant stated it had performed an additional review of the design of McGuire and Catawba and determined that the ice condenser wear slab was not within the scope of license renewal because it did not perform a license renewal function. With respect to the other structures identified in the SER open item, the applicant stated that it disagreed with the staff's conclusion that these structural components require aging management for the period of extended operation. Nonetheless, the applicant stated that it would perform periodic inspections of the accessible portions of the crane wall and ice condenser structural concrete floor during the period of extended operation as part of the Inspection Program for Civil Engineering Structures and Components. Since the ice condenser wear slab does not perform an intended function that meets the license renewal scoping criteria specified in 10 CFR 54.4, the staff agrees with the applicant's finding that the wear slab should not have been included within the scope of license renewal. The staff's review of this item is documented in Section 2.4.1.3.2 of this SER. In addition, since the applicant stated that it would manage the aging effects for the accessible portions of the crane wall and ice condenser structural concrete floor during the period of extended operation (as indicated in its response to SER open item 3.5-1), the staff considers open item 3.5-3 to be closed.

New open item 3.5-4. Neither the FSAR supplement nor the referenced TS and SLCs provided adequate descriptions of the Battery Rack Inspections. The applicant was requested to provide a summary description characterizing the important elements of the Battery Rack Inspections from Section B.3.2 of the LRA and the applicant's response to RAI B.3.2-1.

In its response dated October 2, 2002, the applicant provided a revision to Table 18-1 and Section 18.3 of the FSAR supplements for McGuire and Catawba. The revised FSAR supplements specified that inspections of the structural supports and anchorages of the battery racks would be performed. The staff found the applicant's revisions acceptable, since inspection of these specific sub-components of the battery rack structures was specified. Open item 3.5-4 is considered closed.

New open item 3.5-5. The staff reviewed the FSAR supplement provided in Appendix A-1 and Appendix A-2 of the LRA for McGuire and Catawba, respectively, and compared this information to that provided in Section B.3.10 of the LRA and the clarifications provided by the applicant in response to RAI B.3.10-1. Some important industry standards and the NRC guidelines used for the AMP were not incorporated into Section 18.2.7 of the FSAR supplement. The applicant was requested to update the FSAR supplements to incorporate the standards and guidelines.

In its response dated October 2, 2002, the applicant submitted revised McGuire and Catawba summary descriptions of the Monitoring and Trending attribute for this inspection program, which incorporated reference to the codes and standards listed in the RAI response. The staff found the applicant's revision to the FSAR supplements acceptable because the revisions

ensure that the program will be governed by these codes and standards. Therefore, open item 3.5-5 is closed.

Open item 3.6.1-1. The applicant was requested to provide a technical justification that would demonstrate that visual inspection of high range radiation monitor and high voltage neutron monitoring instrumentation cables would be effective in detecting aging before current leakage could affect instrument loop accuracy.

In its response to open item 3.6.1-1, dated October 2, 2002, the applicant reiterated its view that visual inspections have proven to be effective and useful because visual inspections have revealed potential problems. In a subsequent response dated November 14, 2002, the applicant stated that it will implement a program specifically to resolve open Item 3.6.1-1. The name of this program is the License Renewal Program for Non-EQ Neutron Flux Instrumentation Circuits. The scope of this program includes only non-EQ neutron flux instrumentation cables that are within the scope of license renewal. The other cables under discussion here, high-range radiation monitors/cables and the wide-range neutron flux monitors/cables, are included in the McGuire and Catawba EQ program and already covered for license renewal by this program. The staff found the applicant's response to SER open item 3.6.1-1 acceptable because the applicant will implement an AMP to monitor the aging of these sensitive cables. The staff also determined that the program established reasonable assurance that the intended function of electrical cables that are (1) not subject to the EQ requirement of 10 CFR 50.49, and (2) used in circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation, or moisture will be maintained consistent with the CLB through the period of extended operation. Therefore, open item 3.6.1-1 is closed.

New open item 4.2-1 (not identified in the SER with open items). By letter dated September 13, 2002, the staff requested additional information regarding the impact of the fracture toughness data from the Diablo Canyon 2 surveillance capsule on the PTS assessments for the longitudinal RV beltline welds fabricated from heat No. 21935/12002 at the end of the extended operating term (or end of life extended or EOLE). For tracking purposes, this request was characterized by the staff as open item 4.2-1.

In its response to open item 4.2-1, dated October 28, 2002, the applicant provided revised PTS and USE evaluations for these welds. The staff independently assessed the applicant's response to open item 4.2-1 and revised PTS and USE evaluations for the McGuire 1 RV welds and concluded that the revised $RT_{PTS}$ value for these welds at end of life extended meets the screening criterion for longitudinal welds as stated in the PTS rule and demonstrates that the McGuire 1 RV will comply with the fracture toughness and PTS criteria of 10 CFR 50.61 through the end of the extended period of operation for McGuire 1.

The staff also concluded that the revised USE value for applicable welds at EOLE is above 50 ft-lb screening criterion of the rule for ferritic materials in the irradiated condition and demonstrates that the McGuire 1 RV will comply with the USE screening criteria of 10 CFR Part 50, Appendix G, Section IV.A.1, through the expiration of the extended period of operation for McGuire 1. Therefore, the staff concludes that the applicant's TLAA for the PTS and USE evaluations of McGuire 1 are acceptable pursuant to 10 CFR 54.21(c)(1)(ii). This resolves open item 4.2-1.

Open item 4.3-1. In its response to a staff request for pressurizer sub-component cumulative usage factors (CUFs), the applicant indicated that modified operating procedures had been implemented at McGuire and Catawba to mitigate the effects of insurge/outsurge. In addition, historical plant instrument data were analyzed to determine the insurge/outsurge history both before and after modification of the operating procedures. The applicant indicated that an analysis including these events found that the design CUFs of all components will remain less than 1.0. By letter dated July 9, 2002, the applicant provided the CUFs for the sub-components listed in Table 2-10 of WCAP-14574-A, but did not discuss the impact of the environmental fatigue correlations on these sub-components. Pending completion of the staff's review of the information provided and assessment of the impact of the environmental correlations for these sub-components, this issue was characterized as an open item.

In its letter dated July 9, 2002, the applicant identified several pressurizer sub-components with relatively high design CUFs for McGuire and Catawba. These sub-components include the shell, spray nozzle, lower head heater penetration and nozzle weld, instrument nozzle, and surge nozzle. An assessment by the staff applying a conservative estimate of the environmental factor to these locations indicated that the CUFs may exceed 1.0 during the period of extended operation. However, Turkey Point and North Anna/Surry license renewal applicants used a combination of quantitative and qualitative assessments to argue that the actual CUFs, including environmental effects, are not expected to exceed 1.0 during the period of extended operation. If similar quantitative and qualitative assessments were performed for McGuire and Catawba, the staff would expect similar results to be obtained because McGuire and Catawba are Westinghouse NSSS designs, like Turkey Point, North Anna and Surry. The applicant stated that it would perform further evaluation of the surge line nozzle during the period of extended operation. The staff concludes that the applicant can use the surge line nozzle evaluation as a representative sample to address environmental effects on pressurizer sub-components for McGuire and Catawba during the period of extended operation. If the further evaluation of the surge line identifies the need for additional actions during the period of extended operation, then the applicant should demonstrate the acceptability of pressurizer sub-components, considering environmental fatigue effects, as part of its corrective action. The staff considers open item 4.3-1 closed.

New open item 4.3-2. By letter dated July 9, 2002, the applicant provided a table of CUFs for newer-vintage Westinghouse plant locations identified in NUREG/CR-6260. The staff's review of these data is ongoing. The Catawba UFSAR lists a large number of design cycles for charging and letdown flow changes. Duke's response to RAI 4.3-5 indicates that these transients cause insignificant fatigue and are not counted. The staff notes that NUREG/CR-6260 contains a discussion of these transients for the newer vintage Westinghouse plant and indicates that these transients are not normally counted at PWRs, although some PWRs have reported that the actual cycles of these transients are less than the numbers assumed in the design calculations. However, the NUREG/CR-6260 evaluation indicates the fatigue usage at the charging nozzle for these transients is significant when the reactor water environment is considered. The charging nozzle is one of the locations Duke will assess for fatigue environmental effects. As such, Duke should provide the design stresses and fatigue usage factors associated with the Catawba charging system flow changes.

In its response dated October 2, 2002, the applicant discussed the Catawba charging system flow transients. The applicant indicated that a review of the existing engineering calculations found that the charging and letdown flow change transients cause insignificant fatigue usage.

The staff also reviewed the engineering calculations during a September 18, 2002, meeting with the applicant (summarized by memorandum dated November 18, 2002) and confirmed that the Catawba charging flow transients were determined to cause insignificant fatigue usage. In its July, 9, 2002, submittal, the applicant identified relatively high design basis fatigue usage factors for the RPV outlet nozzle, surge line hot leg nozzle, charging nozzle, and safety injection nozzle for McGuire and Catawba. An assessment by the staff, applying a conservative estimate of the environmental factor to these locations, indicated that the CUFs of these components may exceed 1.0 during the period of extended operation. The applicant stated that it would perform further evaluations of these components, considering environmental effects, prior to the period of extended operation in response to SER open item 4.3-4. This commitment is provided in the revised FSAR supplements for Catawba and McGuire submitted by the applicant in a letter dated October 2, 2002. Therefore, open item 4.3-2 is closed.

Open item 4.3-3. The staff reviewed the Catawba Updated Final Safety Analysis Report (UFSAR), Section 1.7, Regulatory Guides, and Section 5.3.1.4, Special Controls for Ferritic and Austenitic Stainless Steels, and determined that sufficient information was provided in the UFSAR to conclude that underclad cracking was not a concern for Catawba 1 and 2. The staff also reviewed information, submitted by letter from the applicant dated July 9, 2002, to conclude that underclad cracking is not a concern for McGuire 1. However, the staff does not have sufficient information about the McGuire 2 fabrication process to conclude that underclad cracking is not a concern. If the applicant cannot provide conclusive evidence that the fabrication procedure does not result in underclad cracking, then it can furnish an analysis for the license renewal term.

In its response dated October 28, 2002, the applicant stated that Duke had compared the number of design cycles and transients used in the analysis contained in WCAP-15338 with the applicable number of design cycles and transients contained in McGuire Unit 2 design documents, and verifies that WCAP-15338 bounds the number of operating cycles and transients not only for McGuire 2, but also for Catawba Unit 1, whose RV is also fabricated from A508 Class 2 forging segments. In its response to open item 4.3-3, the applicant provided an FSAR supplement summary description to reflect that fatigue analysis in WCAP-15338 for RV underclad cracks in Westinghouse-designed reactors was bounding for the evaluation for RV underclad cracks at McGuire 2. Since the conclusions in WCAP-15338 are bounding and applicable to the evaluation of fatigue-induced crack growth of underclad cracks in the McGuire 2 RV, the staff concludes that the applicant has demonstrated that its analysis for postulated underclad cracks in the McGuire 2 RV remains valid for the extended operating period for McGuire 2, and that the applicant's TLAA for RV underclad cracks at McGuire 2 is acceptable pursuant to 10 CFR 54.21(c)(1)(i). The staff considers SER open item 4.3-3 closed.

New open item 4.3-4. Duke provided a McGuire FSAR supplement for Section 3.9.2 and a Catawba FSAR supplement for Section 3.9.3, which indicate that stress range reduction factors were used in the evaluation of ASME Class 2 and 3 piping systems. Duke also provided a McGuire FSAR supplement for Section 5.2.1 and a Catawba FSAR supplement for Section 3.9.1 to indicate that the Thermal Fatigue Management Program (TFMP) will continue to manage thermal fatigue into the period of extended operation. However, Duke did not describe its commitment to evaluate the effects of the environment on fatigue of reactor coolant system pressure boundary components in the FSAR supplement. Nor did Duke provide a description of its TFMP. A revised FSAR supplement was requested to reflect this information.

In its response dated October 28, 2002, the applicant provided FSAR supplements for Catawba and McGuire. The revised FSAR supplements provided summary descriptions of the TFMP for McGuire and Catawba. The revised FSAR supplements also included the applicant's commitment to perform additional evaluations of the effects of environmental fatigue on the critical locations identified in NUREG/CR-6260 prior to the period of extended operation. Therefore, open item 4.3-4 is closed.

Confirmatory item 2.3.3.26.2-1. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.26-2, the applicant to indicate if piping and nitrogen cylinders associated with a safety-related backup nitrogen control system were within the scope of license renewal. In its response dated April 15, 2002, the applicant confirmed that the Catawba main steam line PORVs are supplied with a nitrogen control system backup to the normal instrument air supply. This backup nitrogen control system consists of valves, tubing, and nitrogen bottles. The applicant stated that the nitrogen bottles are periodically replaced and, therefore, are not subject to an AMR. However, the applicant did not specify the details of the periodic replacement. In electronic correspondence dated July 16, 2002, the applicant stated that a Catawba technical specification surveillance procedure requires nitrogen cylinder replacement if the pressure in either nitrogen cylinder is less than or equal to 2420 psig. Pending the staff's receipt of this information in official correspondence, this item was characterized as confirmatory.

In its response to this confirmatory item, dated October 28, 2002, the applicant formally provided the information that had been furnished in electronic correspondence. The staff finds that the response provides an acceptable basis for excluding these nitrogen bottles from an AMR. Therefore, confirmatory item 2.3.3.26.2-1 is closed.

Confirmatory item 3.6.1-1. The applicant agreed to revise the corrective actions and confirmation process element of the Non-EQ Insulated Cables and Connections Aging Management Program to reflect that the program should consider the potential for moisture in the area of degradation. However, the FSAR supplement needed to be revised to reflect this change to the corrective actions and confirmation process element description.

In its response dated October 2, 2002, the applicant stated that it will add a statement to the Corrective Action & Confirmation Process of the Non-EQ Insulated Cables and Connections Aging Management program summary description contained in Chapter 18 of each station's FSAR supplement to indicate that corrective action should consider the potential for moisture in the area of degradation. The staff found the applicant's response to confirmatory item3.6.1-1 acceptable because the modification to the Non-EQ Insulated Cable and Connections Aging Management Program is reflected in the revised FSAR supplement. Confirmatory item 3.6.1-1 is closed.

Confirmatory item 3.6.2-1. The applicant eliminated the qualifier "significant" from its discussion of exposure to moisture. However, the FSAR supplement needs to be revised to reflect this change in the scope of the Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program.

In its response dated October 2, 2002, the applicant stated that it will insert the summary description of the revised Inaccessible Non-EQ Medium Voltage Cables AMP (as provided in Duke letters dated July 9, 2002, Attachment 1, pages 89-91, and November 5, 2002) in each

station's FSAR supplement in place of the program description previously provided. The staff found the applicant's response to confirmatory item 3.6.2-1 acceptable because the change to the program provided by the applicant will be reflected in the FSAR supplement.

Confirmatory item 4.4-1. To address Generic Safety Issue (GSI) 168, the applicant submitted, in a letter dated July 9, 2002, a technical rationale that demonstrates that the CLB will be maintained until some later point in the period of extended operation, at which time one or more reasonable options would be available to adequately manage the effects of aging. However, the staff requested that the applicant also indicate that it will monitor updates to NUREG-0933, "A Prioritization of Generic Safety Issues," for revisions to GSI-168 during the review of its application, or that it will supplement its license renewal application if the issues associated with GSI-168 become defined such that providing the options or pursuing one of the other approaches described in the SOC becomes feasible.

In its response dated October 2, 2002, the applicant stated that, if the staff were to issue a generic communication that defines the issues associated with GSI-168 such that providing the options or pursuing one of the other approaches described in the SOC to 10 CFR 54 (FR Vol.60, No.88, May 8,1995) becomes feasible, then Duke would supplement its license renewal application. However, the applicant also specified that the staff generic communication should be issued prior to November 1, 2002, in order for Duke to evaluate its contents, prepare a response as a current licensing basis change, if any is required, and provide a supplement to the application (if necessary) in sufficient time for the staff to complete its review prior to the scheduled issuance of the SER for license renewal on January 6, 2003. The resolution to GSI-168 was not issued by the staff prior to November 1, 2002; thus, the applicant's alternative commitment is their original commitment that was stated above in their June 17, 2002, response to GSI-168. Pursuant to the requirements of Part 50, the staff will evaluate the applicant's compliance to the resolution of GSI-168 after its issuance and prior to the extended period of license renewal as part of 10 CFR 50.49 time-limited aging analyses. Resolution of GSI-168 pursuant with Part 50 meets the requirement of 10 CFR 54.21(c)(1)(iii) and is therefore considered acceptable. Confirmatory item 4.4-1 is considered closed.

# 2. SCOPING AND SCREENING

## 2.1 Scoping and Screening Methodology

### 2.1.1 Introduction

Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," Section 54.21, "Contents of Application - Technical Information," requires that each application for license renewal contain an integrated plant assessment IPA. Furthermore, the IPA must list and identify those structure and components (SCs) that are subject to an aging management review (AMR) from the systems, structures, and components (SSCs) that are within the scope of license renewal in accordance with 10 CFR 54.4.

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

In developing the scoping and screening methodology for the Catawba and McGuire LRA, the applicant considered the requirements of the license renewal rule, the Statements of Consideration (SOCs) for the rule, and the guidance provided by the Nuclear Energy Institute (NEI), "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Revision 2, August 2000 (NEI 95-10). In addition, the applicant also considered the U.S. Nuclear Regulatory Commission (NRC) staff's correspondence with other applicants and with the NEI in the development of this methodology.

### 2.1.2 Technical Information in the Application

In Chapters 2.0 and 3.0 of the LRA, the applicant provides the technical information required by 10 CFR 54.21(a). In Section 2.1, "Scoping and Screening Methodology," of the LRA, 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 SCs 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, "System Scoping and Screening Results: Mechanical;" Section 2.4, "Scoping and Screening Results: Structures;" and Section 2.5, "Screening Results: Electrical and Instrumentation and Controls," describe in detail the process that the applicant uses to identify the SCs that are subject to an AMR.

Chapter 3 of the LRA, "Aging Management Review Results," contains the following information—Section 3.1, "Aging Management of Reactor Vessel, Internals and Reactor Coolant System;" Section 3.2, "Aging Management of Engineered Safety Features;" Section 3.3, "Aging Management of Auxiliary Systems;" Section 3.4, "Aging management of Steam and Power Conversion Systems;" Section 3.5, "Aging Management of Containment, Structures, and Component Supports;" Section 3.6, "Aging Management of Electrical and

Instrumentation and Controls." Chapter 4 of the LRA, "Time-Limited Aging Analyses," (TLAAs) contains the applicant's evaluation of time-limited aging analyses.

*2.1.2.1 Scoping Methodology*

Section 2.1.1 of the LRA, "Scoping Methodology," discussed the scoping methodology as it related to the safety-related criteria in accordance with 10 CFR 54.4(a)(1), non-safety-related criteria in accordance with 10 CFR 54.4(a)(2), and the scoping criteria in accordance with 10 CFR 54.4(a)(3) for regulated events.

2.1.2.1.1 Safety-Related Systems, Structures, and Components

The LRA stated that the SSCs within the scope of license renewal include safety-related SSCs, which are those relied upon to remain functional during and following design basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions—

> 1) the integrity of the reactor coolant pressure boundary, 2) the capability 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 that could result in potential offsite exposure comparable to the guidelines in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.

The applicant used the guidance contained in Regulatory Guide (RG) 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," and RG 1.29, "Seismic Design Classification," to establish those mechanical systems which met the scoping criteria of 10 CFR 54.4(a)(1). Piping Classes A, B, and C were designated as safety-related and subject to the requirements of 10 CFR 54.4(a)(1).

The Commission's regulations at *10 Code of Federal Regulations* Part 100, Appendix A, "Seismic and Geological Siting Criteria for Nuclear Power Plants," require that certain structures, systems, and components must remain functional during a safe-shutdown earthquake. The applicant determined the intended functions met the intent of the scoping criteria in 10 CFR 54.4(a)(1). The specific structures required to meet these criteria are identified in RG 1.29 as Seismic Category I and were considered within the scope of license renewal. The classification of each structure had been previously identified and documented in the Updated Final Safety Analysis Report (UFSAR).

The scoping criteria were not applied globally to all electrical systems and components. The scoping criteria were applied only to specific electrical systems in order to demonstrate that they were not within the scope of license renewal. The majority of electrical systems and components were included within the scope of license renewal by default without a detailed scoping evaluation having been performed.

2.1.2.1.2 Non-Safety-Related Systems, Structures, and Components

Certain non-safety-related piping and components had been designated as Duke System Class F. This pipe classification applied to piping and components whose pressure boundary loss could adversely affect safety-related systems and components due to physical interactions. All Duke Class F piping and components met the criteria of 10 CFR 54.4(a)(2) and were

included within the scope of license renewal. Non-safety-related structures whose failure could affect the intended function of safety-related SSCs had been previously designated as Seismic Category II in accordance with RG 1.29. The applicant determined that these structures met the criteria of 10 CFR 54.4(a)(2) and were within the scope of license renewal. Structures not identified as Category I or II had been designated as Category III. Failure of a Category III structure would not have an impact on the integrity of Category I or II structures. Category III structures were not included within the scope unless they met the criteria of 10 CFR 54.4(a)(3). Specific non-safety-related electrical systems and components were reviewed against the scoping criteria of 10 CFR 54.4(a)(2).

2.1.2.1.3 Regulated Events

The systems, structures, and components required to maintain compliance with 10 CFR 54.4(a)(3) were determined through a review of the UFSAR, safety evaluation reports, licensing correspondence files, and other appropriate design documents.

*2.1.2.2 Screening Methodology*

Following the determination of SSCs within the scope of license renewal, the applicant implemented a process for determining which SCs, among those SSCs that were determined to be within the scope of renewal, would be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1). Section 2.1.2 of the LRA, "Screening Methodology," discussed the screening activities as they related to the SSCs that are within the scope of license renewal. The specific screening activities for the various engineering disciplines were further described in the LRA in Section 2.1.2.1 for mechanical components, Section 2.1.2.2 for structural components, and Section 2.1.2.3 for electrical components.

2.1.2.2.1 Screening Methodology for Mechanical Components

Following identification of the SSCs within the scope of license renewal, the applicant performed the following screening review to determine which mechanical components would be subject to an AMR.

The mechanical components within the scope of 10 CFR Part 54 were reviewed to determine those components subject to an AMR in accordance with 10 CFR 54.21(a)(1). An AMR of a mechanical component is required if the component performs an intended function without moving parts or without a change in configuration or properties (i.e., passive) and if it is not subject to replacement on the basis of a qualified life or specified time period (i.e., long-lived).

The screening methodology involved three steps—

- establishment of the license renewal evaluation boundaries
- identification of the intended function(s) of each component
- identification of mechanical components subject to an AMR

The applicant established the evaluation boundaries as either safety-related, non-safety-related, or regulated event boundaries. Piping Classes A, B, and C were designated as safety-related. The intended functions were determined on the basis of the system function, which had been the basis for including the system within the scope of license renewal, and the

component function, which is required to enable the system to perform its intended function. Duke Class F piping was designated as non-safety-related piping and components whose pressure boundary loss could adversely affect safety-related systems and components due to physical interactions. All Duke Class F piping and components met the criteria of 10 CFR 54.4(a)(2). Identification of the components subject to an AMR was performed using plant system flow diagrams (FDs), equipment databases, and the guidance of NEI 95-10, Appendix B.

2.1.2.2.2 Screening Methodology for Structural Components

Following identification of the structural components within the scope of license renewal, the applicant performed the following screening review to determine which structural components would be subject to an AMR.

The intended functions of the structural components were determined through a review of the UFSAR, engineering specifications, regulated event documentation, and the commitments made in response to design basis events. Structural component functions were reviewed to determine whether the structural component (1) supported the intended function of the structure, or (2) had a unique function not required to support the intended function of the structure. In addition, structural components were reviewed to determine whether the component was required to physically support non-safety-related components to prevent physical interaction with safety-related components in order to meet the requirements of 10 CFR 54.4(a)(2).

The structural components within the scope of 10 CFR Part 54 were reviewed to determine those components subject to an AMR in accordance with 10 CFR 54.21(a)(1). An AMR of a structural component is required if the component performs an intended function without moving parts or without a change in configuration or properties (i.e., passive) and if it is not subject to replacement on the basis of a qualified life or specified time period (i.e., long-lived).

The screening methodology involved three steps—

- generation of a list of structural components types
- identification of the intended functions of each component
- identification of structural components subject to an AMR

The applicant developed a list of structural components using the guidance of NUMARC 90-01, NUMARC 90-06, and Appendix B of NEI 95-10. Additional components were added on the basis of commitments made for compliance with regulated events, including fire protection (FP), environmental qualification (EQ), pressurized thermal shock (PTS), anticipated transients without scram, and station blackout (SBO). In addition, the applicant reviewed other specific documents to determine any other structural components not previously identified.

2.1.2.2.3 Screening Methodology for Electrical Components

After identifying the SSCs within the scope of license renewal, the applicant also performed the following screening review to determine which electrical components would be subject to an AMR. As part of this effort, the applicant relied on the requirements set forth in 10 CFR 54.21(a)(1)(i), as supplemented by industry guidance in NEI 95-10, to develop a

commodity evaluation approach on the basis of a plant level evaluation of electrical equipment. The applicant reviewed the component to determine whether the component was passive and long-lived.

The passive components were identified as the following items—

- electrical portions of electrical and Instrumentation and Control penetration assemblies
- high-voltage insulators
- insulated cables and connections
- phase bus
- switchyard bus
- transmission conductors
- uninsulated ground conductors

The application stated that all other electrical and I&C components were active and were not subject to an AMR.

Other electrical and I&C components were in scope only because they performed a passive pressure boundary function (elements, resistance temperature detectors (RTDs), sensors, thermocouples, transducers, and heaters). These components were electrically active, but were subject to an AMR only for the pressure boundary function.

Electrical components that were included in the applicants' environmental qualification program in accordance with 10 CFR 50.49 are replaced on the basis of a qualified life and therefore were not subject to an AMR. These components included certain insulated cables and connections, and all electrical and I&C penetration assemblies. No other electrical components were screened out on the basis of the long-lived screening criterion. The remainder of the integrated plant assessment involved only non-environmentally-qualified electrical and I&C components.

### 2.1.3 Staff Evaluation

From October 15 through 18, 2001, the staff performed an audit of the applicant's license renewal scoping and screening methodology developed to support the license renewal process and documented in the LRA.

The focus of the staff's audit was to evaluate the applicant's administrative control documents governing the implementation of its LRA scoping and screening methodology, and to review selected design documents, including scoping and screening result reports, which provided the technical basis for various plant systems, structures, and components evaluated as part of the LRA scoping and screening methodology.

### *2.1.3.1 Evaluation of the Methodology for Identifying Systems, Structures, and Components Within the Scope of License Renewal*

Definition of Safety-Related Structures, Systems, and Components

In LRA Section 2.1.1.1, "Safety-Related Structures, Systems, and Components," the applicant appropriately stated that plant systems, structures, and components within the scope of license renewal that satisfy the scoping criteria in 10 CFR 54.4(a)(1) are

> (1) safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions—
>
> > (i) the integrity of the reactor coolant pressure boundary;
> >
> > (ii) the capability to shut down the reactor and maintain it in a safe shutdown condition; or
> >
> > (iii) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or § 100.11 of this chapter, as applicable.

However, during the staff's scoping and screening audit, conducted from October 15 to 19, 2001, the staff noted that Section 3.0, "Scoping Methodology," of both Specifications CNS-1274.00-00-0002, "Catawba Systems and Structures Scoping for License Renewal," and MCS-1274.00-00-0002, "McGuire Systems and Structures Scoping for License Renewal," cited superseded regulatory text in establishing the scoping criteria to be used in identifying Catawba and McGuire structures, systems, and components in accordance with 10 CFR 54.4(a)(1) requirements. In particular, these specifications cited the following criteria in reference to 10 CFR 54.4(a)(1) scoping requirements—

> (a) Plant systems, structures, and components within the scope of this part are
>
> (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design bases events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions—
>
> > (i) The integrity of the reactor coolant pressure boundary,
> >
> > (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition, or
> >
> > (iii) The capability to prevent or mitigate the consequences of accidents that could result in potential off-site exposure comparable to the 10 CFR Part 100 guidelines.

By letter dated January 17, 2002, the staff requested the applicant, in RAI (request for additional information) 2.1-1, address the impact, if any, of not having explicitly considered in its scoping methodology for Catawba and McGuire those structures, systems, and components that are relied upon to ensure "the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable," consistent with the current licensing basis CLB.

In its response dated March 1, 2002, the applicant indicated that it had reviewed the scoping criteria in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), and 10 CFR 100.11 as currently written in 10 CFR 54.4(a)(1)(iii) and determined that there was no impact on the scoping review it had described in its LRA. The applicant stated that for 10 CFR 50.34(a)(1), only 10 CFR 50.34(a)(1)(i) was applicable and referred to 10 CFR Part 100 for specific site evaluation factors. Section 100.11 of title 10 of the *Code of Federal Regulations* was applicable and was used in the scoping process. The applicant further indicated that 10 CFR 50.34(a)(1)(ii) was only applicable to 10 CFR Part 50 applications filed on or after January 10, 1997, and was therefore not applicable to Catawba and McGuire. In addition, the applicant stated that 10 CFR 50.67(b)(2) was not applicable because license amendments had not been made at either station to allow use of the revised accident source term. The applicant stated that the scoping methodology specifications would be revised to incorporate the current criteria of 10 CFR 54.4(a)(1)(iii) by June 30, 2002. On the basis of its review of the information provided by the applicant, the staff concluded that the applicant had documented that only a portion of the criteria was applicable to the applicant's plants and that the applicable portion had been incorporated into the license renewal activities. Therefore, the staff concluded that the response to the issue raised met the applicable regulations and was acceptable.

Definition of Non-safety-related Structures, Systems, and Components

Non-safety-related SSCs that are within the scope of license renewal are defined in 10 CFR 54.4(a)(2)—

> All non-safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1) (i), (ii), or (iii) of this section.

In LRA Section 2.1.1.2, "Nonsafety-Related Systems, Structures and Components," the applicant provides its methodologies for identifying mechanical SSCs and electrical systems and components that satisfy the scoping criterion in 10 CFR 54.4(a)(2).

On the basis of its review of information provided by the applicant, the staff concluded that the applicant had adequately documented the 10 CFR 54.4(a)(2) criteria and had incorporated the information into the license renewal activities with the exception of one issue. The staff identified an issue concerning mechanical scoping as RAI 2.1-2, which is discussed in Section 2.1.3.1.1, "Mechanical Scoping Methodology." The staff concluded that the applicant's response to RAI 2.1-2 described a methodology that met the applicable regulations and, therefore, was acceptable.

Regulated Events

The staff determined, as stated in the LRA, that for regulated events, the systems, structures, and components required to maintain compliance with 10 CFR 54.4(a)(3) were determined through a review of the UFSAR, safety evaluation reports (SERs), licensing correspondence files, and other appropriate design documents and were included in scope on the basis of the requirements of 10 CFR 54.4(a)(3). The staff reviewed examples of documents that used this method and did not identify any discrepancies between the methodology documented and the implementation results.

2.1.3.1.1 Mechanical Scoping Methodology

The applicant based the scoping activities on several sets of information. The applicant had developed a set of FDs in 1971 using all design basis information and the FDs had been subsequently maintained current to date. Design basis documents (DBDs) had been prepared during design basis reconstitution (performed prior to license renewal activities). The DBDs were developed on the basis of the FDs, or compared to the FDs with the FDs being the reference standard. The FDs and DBDs were used to provide the basis for those mechanical systems meeting the criteria of 10 CFR 54.4(a)(1) and (a)(2). In addition, the appendices in Nuclear System Directive (NSD) 307, "Quality Standards Manual," were used, after the FDs were reviewed, to identify any systems which had not been previously identified.

The applicant used the guidance contained in RG 1.26 and RG 1.29 to establish those mechanical systems which met the scoping criteria of 10 CFR 54.4(a)(1). Piping Classes A, B, and C were designated as safety-related and subject to requirements of 10 CFR 54.4(a)(1). The applicant identified the safety-related mechanical boundaries using the FDs.

Certain non-safety-related piping and components had been designated as Duke Class F piping. This was applied to piping and components whose pressure boundary loss could adversely affect safety-related systems and components due to physical interactions. All Duke Class F piping and components met the criteria of 10 CFR 54.4(a)(2) and were included within the scope of license renewal. The applicant identified the Duke Class F boundaries using the FDs and all non-safety-related functions using the DBDs, UFSAR, calculations, specifications, and licensing correspondence. In addition, the applicant used the DBDs, UFSAR, calculations, specifications, and licensing correspondence to identify all mechanical components required to meet 10 CFR 54.4(a)(3).

The staff noted that piping Classes E, G, and H, which were seismically supported so as not to affect safety-related components, were not included in the scope of license renewal (the piping hangers were) but were possibly in the proximity of safety-related components. The staff discussed the applicant's approach to identifying non-safety-related components that could affect safety-related components with the applicant and, by letter dated January 17, 2002, requested, in RAI 2.1-2, specific clarification regarding the applicant's approach to scoping and screening non-safety-related SSCs in accordance with 10 CFR 54.4(a)(2).

In its response dated April 15, 2002, the applicant indicated that the initial design of the modern-vintage plants had incorporated detailed consideration of both fluid and spatial interactions of non-safety-related sources on safety-related equipment, was continued through the modification process, and provided the basis for meeting the scoping requirements of 10 CFR 54.4(a)(2). The analyses used had been performed for every area of the plants that housed safety-related equipment and included both spatial and fluid interaction. This response was further clarified during a May 24, 2002, telephone call, which was documented by memorandum issued June 7, 2002.

The applicant stated that all non-safety-related, high-energy piping in proximity of safety-related equipment was designated Duke Class F and was within the scope of license renewal. Piping Classes E, G, and H were moderate-energy pipe. The moderate-energy pipe had been analyzed on the basis of a postulated through-wall crack on pipes greater than 1-inch nominal pipe size. The spray was assumed to impact equipment up to 30 feet in all directions from the

spray source. When potential impact had been identified, piping was rerouted, equipment was relocated, or the equipment was qualified for the effects of spray, temperature, and wetting.

Piping less than 1-inch nominal size was physically located in parallel runs with piping of various sizes. The smaller pipes were proximal to larger pipes that were evaluated for spray effects and such evaluations bounded the potential spray effects from the smaller piping. The applicant indicated that the potential of small-piping runs proximal to safety-related equipment, but not proximal to larger pipes, had been reviewed, and that this did not exist in areas containing safety-related equipment. The applicant's treatment of piping less than 1-inch nominal size also was explained during an NRC scoping and screening inspection, as documented in Inspection Reports 50-369/02-05, 50-370/02-05, 50-413/02-05, and 50-414/02-05, dated May 6, 2002, and during a May 24, 2002, telephone call, which was documented by memorandum dated June 7, 2002. Based upon the information presented during the conference calls and documented in the NRC inspection report, the staff concluded that the treatment of this class of very small pipe was acceptable.

The staff concluded that the applicant's approach to identifying non-safety-related SCs that could potentially affect safety-related SCs (e.g., designating pipe in high-energy systems and seismic hangers supporting pipe in moderate-energy pipe systems as within scope), and the rationale for excluding the less than 1-inch pipe due to its potential impact being bounded by the larger, proximal pipes, met the requirements of 10 CFR 54.4(a)(2) and was acceptable. The audit team did not identify any discrepancies between the methodology documented and the implementation results.

For non-safety-related equipment (other than piping systems) in proximity to safety-related systems, the applicant indicated that it had taken the mitigative approach and determined that the seismic supports and restraints would prevent physical interaction and that the seismic supports and restraints were included within the scope of license renewal. The staff concluded that the inclusion of the seismic supports was adequate to restrain non-fluid-bearing equipment, since the method of potential impact was physical contact. On the basis of its review of the information, the staff concludes that the response to RAI 2.1-2 was acceptable because the applicant had demonstrated that it performed its scoping review in accordance with 10 CFR 54.4(a)(2).

2.1.3.1.2 Structural Scoping Methodology

As stated in Section 2.1.1.1.2 of the LRA, "Safety-Related Structures," the staff determined that all structures at both the McGuire and Catawba Nuclear Stations were classified according to their design function. Appendix A to 10 CFR Part 100, "Seismic and Geological Citing Criteria for Nuclear Power Plants," requires that all nuclear power plants be designed so that, if a safe-shutdown earthquake occurs, certain SSCs remain functional.

The applicant determined that the three functions meet the intent of those specified in the scoping criteria in 10 CFR 54.4(a)(1). The specific structures that are required to ensure these functions are satisfactorily implemented are identified in RG 1.29 as Seismic Category I structures. All safety-related structures were designated as Seismic Category I and are within the scope of license renewal. The classification of each structure had been previously determined and documented in the McGuire UFSAR and Catawba UFSAR. Category I structures had been identified through a review of the plant UFSAR.

Section 2.1.1.2.2 of the LRA, "Non-safety-Related Structures," stated that structures whose continued function is not required, but whose failure could impact the function of safety-related SSCs or could injure control room occupants are designated as Seismic Category II in accordance with RG 1.29 Position C. The structures are classified as non-safety-related, but are designed to prevent detrimental effects to safety-related SSCs. Category II structures meet the intent of 10 CFR 54.4(a)(2) and were determined to be within the scope of license renewal.

Structures at McGuire and Catawba that were not identified as either Category I or II were classified as Category III structures. Category III structures were those whose functions were not related to nuclear safety and whose collapse under earthquake loading would not impair the integrity of seismic Category I or II items. Category III structures were not within the scope of license renewal unless they were determined to meet the criteria of 10 CFR 54.4(a)(3).

The classification of each structure had been previously determined and documented in the McGuire UFSAR and Catawba UFSAR. Category II structures were identified through a review of the plant UFSAR. The staff reviewed the classification of structure types, and discussed the process with the applicant, and the applicant provided a demonstration of the scoping process, including examples of application of the process and the resulting documentation. On the basis of this review, the staff did not identify any discrepancies between the methodology documented and the implementation results.

2.1.3.1.3 Electrical Scoping Methodology

The staff reviewed Sections 2.1.1.1.3, 2.1.2.3, and 2.5 of the LRA to determine the adequacy of the method that the applicant had used to identify the electrical components within the scope of license renewal in accordance with 10 CFR 54.4. During the scoping and screening methodology audit, the staff met with applicant representatives to discuss the applicant's methodology for electrical scoping and to review design basis documents that support the LRA.

The staff reviewed document DPS (MCS, CNS) 1274.00-00-0006, "Electrical Component Integrated Plant Assessment and Evaluation of Time-Limited Aging Analysis for License Renewal," Rev. 01, June 12, 2001. This document applied to both McGuire and Catawba plants. The purpose of the document was to describe the scoping and screening process used by the applicant to identify electrical components that were subject to an AMR and to present the results of that process.

The scoping criteria were not applied globally to all electrical systems and components. The majority of electrical systems and components were included within the scope of license renewal by default without a detailed scoping evaluation having been performed. The scoping criteria were applied only to specific electrical systems in order to demonstrate that they were not within the scope of license renewal. The staff finds this approach conservative and acceptable because it would identify more electrical components subject to an AMR than are required by the rule.

The staff reviewed the document MCS-1274.00-00-0002, "McGuire Systems and Structures Scoping for License Renewal," Rev. 05, September 12, 2001, and a nearly identical document for Catawba. LRA Section 3.3 described the applicant's electrical system and component scoping process. The applicant assumed that all electrical components were within the scope of license renewal unless a specific scoping evaluation was performed that demonstrated they were not within the scope of license renewal. The scoping process described by the applicant

was used to determine that an electrical component or commodity group was not in scope for license renewal. In order to demonstrate that an electrical system, component, or commodity group was not within the scope of license renewal, a scoping evaluation was performed. The evaluation involved describing the system, component, or commodity group functions and then evaluating these functions against the scoping criteria of 10 CFR 54.4(a).

The staff reviewed several sections of the LRA which evaluated specific systems and components for application of the methodology (1) Section 4.3.1 (phase bus in the switchyard systems EA, EB, and ES of both plants) and (2) Section 4.3.2 (unit main power system EPA) and (3) Section 4.3.3 (6.9 kV normal auxiliary power system EPB). The applicant concluded that the only electrical components in the scope of license renewal and subject to an AMR were non-EQ insulated cables and connections. The staff reviewed the classification of electrical components and discussed the process with the applicant. The applicant provided a demonstration of the scoping process, including examples of how the process was applied and the resulting documentation. On the basis of this review, the staff did not identify any discrepancies between the methodology documented and the implementation results.

The staff considered the original information supplied in the LRA and additional information supplied by the applicant during the audit and subsequent responses to staff RAIs, particularly RAIs 2.5-1 and 2.5-2 (discussed in detail in Section 2.5.2 of this SER). This information included identification and inclusion in scope of the SSCs meeting the requirements of 10 CFR Part 54.4(a)(1) identification and inclusion in scope of the SSCs meeting the requirements of 10 CFR Part 54.4(a)(2) and identification and inclusion in scope of the SSCs meeting the requirements of 10 CFR Part 54.4(a)(3). On the basis of this information, the staff concludes that the method developed and implemented by the applicant is sufficient to ensure that all applicable SSCs are considered in scope of license renewal.

*2.1.3.2 Evaluation of the Methodology for Identifying Structures and Components Subject to an Aging Management Review*

2.1.3.2.1 Mechanical Component Screening Methodology

The mechanical components within the scope of 10 CFR Part 54 were reviewed to determine those components subject to an AMR in accordance with 10 CFR 54.21(a)(1). An AMR of a mechanical component is required if the component performs an intended function without moving parts or without a change in configuration or properties (i.e., passive) and if it is not subject to replacement on the basis of a qualified life or specified time period (i.e., long-lived).

The screening methodology involved three steps—

1. establishment of the license renewal evaluation boundaries
2. identification of the intended function(s) of each component
3. identification of mechanical components subject to an AMR

The staff determined, as stated in the LRA, that the applicant had established the evaluation boundaries as either safety-related, non-safety-related, or regulated event boundaries. The applicant's Piping Classes A, B, and C were designated as safety-related. The applicant's Class F piping was designated as non-safety-related piping and components whose pressure boundary loss could adversely affect safety-related systems and components due to physical

interactions. All Class F piping and components met the criteria of 10 CFR 54.4(a)(2). The intended functions were determined based on the system function, which is the basis for including the system within the scope of license renewal, and the component function, which is that which is required to enable the system to perform its intended function. Identification of the components subject to an AMR was performed using plant system flow diagrams, equipment databases, and the guidance of NEI 95-10, Appendix B.

The staff reviewed the "Feedwater System Component Screening and Aging Management Review for License Renewal" and the "Safety Injection System Component Screening and Aging Management Review for License Renewal" as examples to determine how the methodology had been applied. The applicant determined that the evaluation boundaries for the feedwater system had extended onto the FD of the auxiliary feedwater (AFW) system. For the purposes of the feedwater system screening, the extended portions had been included in the feedwater system specification for completeness.

Again, using the feedwater system and safety injection system (SIS) as examples, the applicant demonstrated how it used scoping results to indicate evaluation boundaries on FDs. The applicant demonstrated how it had evaluated components to determine if they were subject to an AMR. Specifically, the applicant described how it (1) identified the components' intended functions (using DBDs and the UFSAR) (2) determined the materials of construction (using FDs and vendor drawings) and (3) identified the internal and external environments (using FDs and DBDs). The audit team did not identify any inconsistencies between the methodology described in the LRA and implementing procedures, and the process demonstrated by the applicant.

Some components that are common to many systems were evaluated separately by the applicant in Section 2.1.2.1.2 of the LRA as replace on condition commodities. Examples of these commodities include filter media, such as paper filters, charcoal filters, and resins. On page 2.1-21 of the LRA, the applicant stated that periodic testing and inspection programs are in place to monitor filter performance, degradation of which may be indicated by an increase in differential pressure or a change in absorption efficiency. The filter mediums are replaced as conditions warrant and, therefore, are not subject to an AMR. As stated in the SRP-LR, system filters, fire extinguishers, fire hoses, and air packs may be excluded, on a plant-specific basis, from an AMR under 10 CFR 54.21(a)(1)(ii) in that they are replaced on condition; however, the application should identify the standards that are relied on for replacement as part of the methodology description. Since the applicant indicated that periodic testing and inspection programs are in place to monitor filter performance, degradation of which may be indicated by an increase in differential pressure or a change in absorption efficiency, the staff finds the applicant's treatment of these consumables acceptable because it conforms to 10 CFR 54.21(a)(1)(ii).

2.1.3.2.2 Structural Screening Methodology

The staff determined that Section 2.1.2.2, "Screening Methodology for Structural Components," of the LRA provided the methodology for determining the structural components subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1) of the license renewal rule. The component screening methodology for McGuire and Catawba involved the following steps—

1. generation of a list of structural component types
2. identification of the intended function(s) of each structural component
3. identification of structural components subject to AMR

Consistent with the guidance provided in NEI 95-10, the structures and structural components within the scope of license renewal are long-lived and passive; therefore, they require an AMR. The tables contained in Section 3.5 of the LRA list the structural components that are subject to AMR along with their intended functions. The staff reviewed the list of structural component types, reviewed the intended functions for several examples of structures and structural components, and reviewed the process of identification of structural components subject to an AMR. The audit team did not identify any discrepancies between the methodology documented and the implementation results.

2.1.3.2.3 Electrical Screening Methodology

The staff reviewed Sections 2.1.1.1.3, 2.1.2.3, and 2.5 of the LRA to determine the adequacy of the method used by the applicant to identify the electrical components subject to an AMR, in accordance with the requirements of 10 CFR 54.21(a)(1). The staff met with applicant representatives to discuss their methodology for electrical screening and to review basis documents that support the LRA.

The staff reviewed document DPS (MCS, CNS) 1274.00-00-0006, "Electrical Component Integrated Plant Assessment and Evaluation of Time-Limited Aging Analysis for License Renewal," Rev. 01, June 12, 2001. This document applied to both McGuire and Catawba Nuclear Stations. The purpose of the document was to describe the scoping and screening process used by the applicant to identify electrical components that were subject to an AMR and to present the results of that process.

The applicant began the process with a list of electrical commodities, which is the generic list from Appendix B of NEI 95-10. Next, the applicant applied passive screening that eliminated from the list all commodities that were active rather than passive (i.e.,components that performed an intended function without moving parts or without a change in configuration). The remaining seven passive commodities were insulated cables and connections, uninsulated ground connectors, transmission conductors, phase bus, switchyard bus, electrical portions of electrical penetrations, and high-voltage insulators.

The applicant applied long-lived screening criteria to the remaining passive components. Components that were to be replaced on the basis of a qualified life were removed from any further consideration for an AMR. The applicant concluded that all electrical components included in the applicant's environmental qualification program that were short-lived were screened out. The resulting list includes only non-EQ electrical components.

The staff reviewed several sections of the LRA which evaluated specific systems and components for application of the methodology. These sections are (1) Section 4.3.1 (phase bus in the switchyard systems EA, EB, and ES of both plants), (2) Section 4.3.2 (unit main power system EPA), and (3) Section 4.3.3 (6.9 kV normal auxiliary power system EPB). The applicant had concluded that the only electrical components in the scope of license renewal and subject to an AMR were non-EQ insulated cables and connections. The audit team did not

identify any discrepancies between the methodology documented and the implementation results.

The staff reviewed information related to the methods used for screening of mechanical, structural, and electrical SCs. On the basis of the its review of information provided in the LRA, and additional information supplied by the applicant during the audit, the staff concludes that the applicant's methodology for identifying structures and components subject to an AMR meets the requirements of 10 CFR 54.21.

### 2.1.4 Conclusions

The staff review of the information presented in Section 2.1 of the LRA, the supporting information in the plants' UFSARs, the information presented during the scoping and screening audit and inspection, and the applicant's responses to the staff's RAIs, as discussed above, 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, was consistent with the requirements of the license renewal rule and the staff's position on the treatment of non-safety-related SSCs. The staff concludes that there is reasonable assurance that the scoping and screening methodology used by the applicant to identify SSCs within the scope of the rule and SCs that are subject to an AMR is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21.

## 2.2 Plant Level Scoping Results

### 2.2.1 Introduction

The applicant described the process for identifying the SSCs within the scope of license renewal in Section 2.1.1 of the LRA. Using that scoping methodology, the applicant identified the SSCs that are within the scope of license renewal and the systems and structures (SSs) that are not within the scope of license renewal. The applicant provided the results of its scoping review in Section 2.2 of the LRA, "Plant Level Scoping Results." The staff reviewed Section 2.2 of the LRA to determine whether there is reasonable assurance that the applicant has properly identified all plant level SSCs that are relied upon to mitigate design basis events as required by 10 CFR 54.4(a)(1) or whose failure could prevent mitigation of design basis events as required by 10 CFR 54.4(a)(2), as well as the SSCs relied on in safety analyses or plant evaluations to perform a function that is required by one of the regulations referenced in 10 CFR 54.4(a)(3).

### 2.2.2 Technical Information in the Application

*2.2.2.1 Systems, Structures, and Components Within the Scope of License Renewal*

The SSCs that the applicant has determined to be within the scope of license renewal are presented in Table 2.2-1, "McGuire Systems and Structures within the Scope of License Renewal," and Table 2.2-2, "Catawba Systems and Structures within the Scope of License Renewal," of the LRA. The mechanical systems listed in Tables 2.2-1 and 2.2-2 are described in Section 2.3 of the LRA. The structures listed in Tables 2.2-1 and 2.2-2 are described in Section 2.4 of the LRA. The electrical and instrumentation and control (I&C) components are described in Section 2.5. In regard to electrical systems, the applicant stated on pages 2.2-6 and 2.2-10

that, except for the switchyard systems, unit main power system, nonsegregated-phase bus in the 6.9 kV normal auxiliary power system, and uninsulated ground conductors, all other electrical, instrumentation, and control systems and components were found to be within the scope of license renewal.

*2.2.2.2 Systems and Structures Not Within the Scope of License Renewal*

The SSs that the applicant has determined not to be within the scope of license renewal are presented in Table 2.2-3, "McGuire Systems and Structures Not Within the Scope of License Renewal," and Table 2.2-4, "Catawba Systems and Structures Not Within the Scope of License Renewal," of the LRA. In regard to electrical systems and components, the applicant stated on pages 2.2-13 and 2.2-16 that the switchyard systems, unit main power system, nonsegregated-phase bus in the 6.9 kV normal auxiliary power system, and uninsulated ground conductors were found not to be within the scope of license renewal.

**2.2.3 Staff Evaluation**

The staff reviewed Section 2.2, and specifically Tables 2.2-1, 2.2-2, 2.2-3, and 2.2-4 of the LRA, to determine whether there is reasonable assurance that the applicant had properly identified all plant level SSCs that are within the scope of license renewal as required by 10 CFR 54.4. The staff focused its review on verifying that the implementation of the applicant's methodology discussed in Section 2.1.1 of this SER did not result in the omission of SSCs from the scope of license renewal.

The staff used the UFSARs for both units of McGuire and Catawba in performing its review. Pursuant to 10 CFR 50.34(b), the UFSAR contains a description and analysis of the SSCs of the facility, with emphasis upon performance requirements; the bases, with technical justification, upon which such requirements have been established; and the evaluations required to show that safety functions will be accomplished. The UFSAR is required to be updated periodically pursuant to 10 CFR 50.71(e). Thus, the UFSAR contains updated plant-specific licensing basis information regarding the SSCs and their functions.

The staff sampled the contents of the UFSAR, based on the listing of the SSs in Tables 2.2-3 and 2.2-4 of the LRA, to identify whether there are SSs that may have intended functions in accordance with the scoping requirements of 10 CFR 54.4 but were listed by the applicant as not within the scope of license renewal.

During its review, the staff determined that additional information was needed to complete its review. By letter dated January 23, 2002, the staff requested, in RAI 2.2.1-1, that the applicant provide the basis for listing the control rod drive ventilation system and the incore instrumentation area ventilation system on Table 2.2-3 as not within the scope of license renewal. The staff referred to Table 8-1 of McGuire UFSAR that lists both the control rod drive ventilation fans and the incore instrumentation room air handling units as receiving power from the 4160 volt essential auxiliary power system during a blackout or accident condition. In its response dated March 1, 2002, the applicant stated that the control rod drive ventilation system and the incore instrumentation area ventilation system are non-safety related ventilation systems and are not credited for any design basis event. The applicant further stated that the control rod drive ventilation system and the incore instrumentation area ventilation system are listed in

Table 8-1 of McGuire UFSAR as loads on the emergency diesel generators (EDGs) and that these systems, when powered by the EDGs, provide additional containment cooling and are not required to mitigate the consequences of design basis events. The staff finds the applicant's response acceptable because the control rod drive ventilation system and the incore instrumentation area ventilation system are not safety-related or credited for any design basis event and are not, therefore, within the scope of license renewal as defined in 10 CFR 54.4.

By letter dated January 23, 2002, the staff requested, in RAI 2.2.1-2, that the applicant provide the basis for listing the diesel building in LRA Table 2.2-3 as not being within the scope of license renewal, and for listing the Unit 1 and 2 diesel generator buildings in LRA Table 2.2-1 as within the scope of license renewal. In its response dated March 1, 2002, the applicant stated that the diesel building (#7434) is outside the protected area, houses power for the non-vital telecommunications building, and, as such, is not within the scope of license renewal. The applicant further explained that the Unit 1 and 2 diesel generator buildings house the emergency diesel generators and are within the scope of license renewal. Since the applicant explained that the diesel building listed in Table 2.2-3 does not meet any of the scoping criteria for license renewal, the staff finds the applicant's response acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.2.1-3, that the applicant provide the basis for listing the radwaste facility and the retired steam generator (SG) storage facility on Table 2.2-3 of the LRA as not being within the scope of license renewal. These structures contain significant levels of radioactivity and, as documented in Section 12.1.2.1 of the McGuire UFSAR, are shielded by thick concrete walls. In its RAI, the staff asked if an intended function of these walls is to mitigate the consequences of accidents that could result in potential offsite exposure. In its response dated March 1, 2002, the applicant stated that the walls of the radwaste facility and of the retired SG storage facility are designed for shielding and are not designed to mitigate the consequences of accidents that could result in potential offsite exposure comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11. Since the applicant demonstrated that the walls of the radwaste facility and of the retired SG storage facility do not meet the scoping criteria for license renewal as defined in 10 CFR 54.4, the staff finds the applicant's response acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.2.1-4, that the applicant provide the basis for listing the condensate system and the condensate storage system on LRA Table 2.2-3, as not being within the scope of license renewal. In its RAI, the staff referred to its February 19, 1992, safety evaluation for SBO for McGuire. In that safety evaluation, the staff stated that there was sufficient water to cope with decay heat removal during a 4-hour SBO event at McGuire, based on the ability to align the turbine-driven AFW pump to the AFW storage tank, the upper surge tank, and the condenser hotwell, as well as the ability to align the AFW to the condenser circulating water (CCW) system. In its response dated March 1, 2002, the applicant quoted another section of the February 19, 1992, safety evaluation—

> There are, however, no technical specifications limits on the levels of these water sources, and therefore, there are no guarantees that these sources of condensate will be available during an SBO event. If, for any reason, sufficient sources of condensate-grade water are unavailable, the licensee can align the turbine-driven AFW pumps to take suction from the CCW system, which can provide non-condensate-grade water for 72 hours. Therefore, McGuire has sufficient sources of water to cope with a four-hour SBO.

The staff finds the applicant's response acceptable because, as stated in the February 19, 1992, safety evaluation, there are no technical specifications limits on the condensate system and the condensate storage system water level, the systems are not relied upon in the plant evaluation to perform a function that demonstrates compliance with the SBO regulations, and, therefore, these systems are not within the scope of license renewal as defined in 10 CFR 54.4(a)(3).

By letter dated January 23, 2002, the staff requested, in RAI 2.2.1-5, that the applicant provide the basis for listing the retired SG facility on Table 2.2-4 of the LRA as not being within the scope of license renewal. This structure contains significant levels of radioactivity and, as documented in Section 12.1.2.1 of the Catawba UFSAR, is shielded by thick concrete walls. In its RAI, the staff questioned the intended function of these walls to mitigate the consequences of accidents that could result in potential offsite exposure. In its response dated March 1, 2002, the applicant stated that the walls of the retired SG facility are designed for shielding and are not designed to mitigate the consequences of accidents that could result in potential offsite exposure comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11. Because the applicant explained that these structures did not meet the scoping criteria for license renewal as defined in 10 CFR 54.4, the staff finds the applicant's response acceptable.

### 2.2.4 Conclusion

On the basis of its review of the information presented in Sections 2.2-1 and 2.2-2 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the information provided in response to RAIs, the staff concludes that there is reasonable assurance that the applicant has identified all SSCs whose intended functions meet the scoping requirements of 10 CFR 54.4.

## 2.3 System Scoping and Screening Results: Mechanical

2.3.1 System Scoping and Screening Results: Reactor Coolant System

In Section 2.3.1, "Reactor Coolant System," of the LRA, the applicant described the SSCs of the reactor coolant system (RCS) that are subject to AMR for license renewal. The following RCS Class 1 components were described in Section 2.3.1 of the LRA—

- Class 1 piping, valves, and pumps
- pressurizer
- reactor vessel (RV) and control rod drive mechanism (CRDM) pressure boundary
- reactor vessel internals
- steam generator

*2.3.1.1 Reactor Coolant System*

In the McGuire and Catawba LRA, Section 2.3.1.1, "Reactor Coolant System Description," the applicant describes the RCS and RCS components that are within the scope of license renewal and subject to an AMR for McGuire and Catawba. The RCSs are similar for both facilities, and unless otherwise specified, the information provided below is applicable to the McGuire and Catawba RCSs. The McGuire UFSAR Chapter 5, "Reactor Coolant System," and the Catawba

UFSAR Chapter 5, "Reactor Coolant System," provide additional information concerning the McGuire and Catawba RCSs, respectively.

2.3.1.1.1 Technical Information in the Application

As described in the LRA, the RCS consists of four similar heat transfer (HT) loops connected in parallel to the reactor pressure vessel. Each loop contains a reactor coolant pump (RCP), steam generator, and associated piping and valves. In addition, the system includes a pressurizer, a pressurizer relief tank (Class F), interconnecting piping, and instrumentation necessary for operational control. All major components are located in the reactor building.

During operation, the RCS transfers the heat generated in the core to the SGs, where steam is produced to drive the turbine generator. Borated demineralized water is circulated in the RCS at a flow rate and temperature consistent with achieving the reactor core thermal-hydraulic performance. The water also acts as a neutron moderator and reflector and as a solvent for the neutron absorber used in chemical shim control.

The RCS pressure boundary provides a barrier against the release of radioactivity generated within the reactor, and is designed to ensure a high degree of integrity throughout the life of the unit. RCS pressure is controlled by the use of the pressurizer, where water and steam are maintained in equilibrium by electrical heaters or water sprays. Steam can be formed (by the heaters) or condensed (by the pressurizer spray) to minimize pressure variations due to contraction and expansion of the reactor coolant. Spring-loaded safety valves and power-operated relief valves (PORVs) are mounted on the pressurizer and discharged to the pressurizer relief tank, where the steam is condensed and cooled by mixing with water.

Chapter 5, "Reactor Coolant System," of both McGuire and Catawba UFSARs, provides additional information concerning the McGuire and Catawba reactor coolant systems. The component types, component functions, materials of construction, environments, aging effects, and aging management programs (AMPs)/activities for the McGuire and Catawba RCS are listed in Table 3.1-1 of the LRA. The component types that were identified in the table include exterior surfaces of pressure boundary components, valve bolting material, reactor coolant pump main flange bolts, pressurizer manway cover bolts/studs, reactor vessel closure studs, nuts and washers, SG bolting, reactor vessel, and pressurizer integral attachments.

2.3.1.1.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the RCS components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba pertaining to the RCS and associated pressure boundary 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 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 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 an applicable intended function or functions, the staff sought to verify that they either perform the function or functions 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 systems, structures, and components 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. The staff did not identify any omissions.

2.3.1.1.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1.1 of the LRA and the supporting information in the McGuire and Catawba UFSARs, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the RCS and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR Part 54.4(a) and 10 CFR Part 54.21(a)(1).

*2.3.1.2 Class 1 Piping, Valves and Pumps*

In the McGuire and Catawba LRA, Section 2.3.1.2, "Class 1 Piping, Valves and Pumps," the applicant describes the RCS Class 1 piping and associated components that are within the scope of license renewal and subject to an AMR for McGuire and Catawba. The Class 1 piping and associated components are similar for both facilities, and unless otherwise specified, the information provided below is applicable to McGuire and Catawba. The McGuire UFSAR Section 5.5, "Component and Subsystem Design," and the Catawba UFSAR Section 5.4, "Component and Subsystem Design," provide additional information concerning the McGuire and Catawba RCS Class 1 piping and associated components, respectively.

2.3.1.2.1 Technical Information in the Application

The RCS Class 1 piping and associated pressure boundary components consist of the following items—

- Westinghouse-supplied primary loop piping which interconnects the reactor vessel, SGs, and reactor coolant pumps
- Duke-designed Class 1 piping
- pressure boundary portion of Class 1 valves (bodies and bonnets, bolting)
- pressure boundary portion of the reactor coolant pump (casing, main closure flange thermal barrier heat exchanger and bolting)

The Westinghouse-supplied primary loop piping consists of four loops of piping interconnecting the reactor vessel, SG, and reactor coolant pump in each loop. This piping includes branch connection nozzles and special items such as the RTD scoop elements, pressurizer spray

scoop, sample connection scoop, reactor coolant temperature element installation boss, and the temperature element well.

Class 1 branch piping consists of piping connected at the Westinghouse-supplied primary loop piping out to and including (1) the outermost containment isolation valve (CIV) in piping which penetrates primary containment, or (2) the second of two valves normally closed during normal reactor operation in piping which does not penetrate primary containment. Some Class 1 branch lines and instrument connections in the RCS are equipped with ⅜-inch inner diameter (ID) flow restricting orifices that limit the maximum flow from a break downstream of the flow restriction to below the makeup capability of the RCS. This orifice is used instead of double isolation valves to make the break from Class 1 to Class 2.

For Class 1 valves, the pressure-retaining portion of the component consists of the valve body, bonnet, and closure bolting. The valves are welded in place with the exception of the pressurizer safety valves that have flanged connections.

For the reactor coolant pumps, the pressure-retaining portion of the component includes the pump casing, the main closure flange, the thermal barrier heat exchanger within the reactor coolant pump, the reactor coolant pump seals, and the pressure retaining bolting. The reactor coolant pump seals are excluded from AMR because they are periodically replaced. Preventive maintenance is currently scheduled every three cycles for the reactor coolant pump seals unless data indicates that the inspection must be done more frequently.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for the McGuire and Catawba reactor coolant system Class 1 piping and associated pressure boundary components are listed in Table 3.1-1 of the LRA. The component types that were identified in the table include hot and cold leg pipes, elbows, pipe fittings, branch connections, orifices, valve bodies and/or bonnets, reactor coolant pump casings, main pump closure flange, and thermal barrier heat exchanger piping (tubing) and flanges.

2.3.1.2.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the Class 1 piping and associated pressure boundary components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba for the Class 1 piping and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 systems, structures, and components 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. The staff did not identify any omissions.

2.3.1.2.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1.2 of the LRA, and the supporting information in the McGuire and Catawba UFSARs, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the Class 1 piping and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

*2.3.1.3 Pressurizer*

In the McGuire and Catawba LRA, Section 2.3.1.3, "Pressurizer," the applicant describes the pressurizer and associated components that are within the scope of license renewal and subject to an AMR for McGuire and Catawba. The pressurizer and associated components are similar for both facilities, and unless otherwise specified, the information provided below is applicable to McGuire and Catawba. The McGuire UFSAR Section 5.5.10, "Pressurizer," and the Catawba UFSAR Section 5.4.10, "Pressurizer," provide additional information concerning the McGuire and Catawba pressurizers and associated components, respectively.

2.3.1.3.1 Technical Information in the Application

The pressurizer is a vertical, cylindrical vessel with hemispherical top and bottom heads that is connected to the RCS on one of the hot legs of a coolant loop. Electrical heaters are installed through the bottom head of the pressurizer while the spray nozzle, relief, and safety valve connections are located in the top head of the pressurizer. The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for all four of the McGuire and Catawba pressurizers are listed in Table 3.1-1 of the LRA. The component types that were identified in the table include lower head shell, upper head manway, surge nozzle, spray nozzle, relief nozzle, safety nozzle, immersion heaters sheath, surge and spray nozzle thermal sleeves, support skirt and flange, manway insert, heater well nozzle, instrument nozzles, surge nozzle safe end, spray nozzle safe end, relief nozzle safe end, and safety nozzle safe end.

2.3.1.3.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the pressurizer components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba for the pressurizer and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 systems, structures, and components 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.

During its review, the staff noted that some Westinghouse pressurizers are designed with seismic lugs and valve support bracket lugs. By letter dated January 28, 2002, the staff requested, in RAI 2.3.1-2, the applicant to verify whether such components exist in McGuire and Catawba plants; and if they do, then the applicant should explain why the subject components do not require an AMR. Based on past license renewal reviews, the staff believes that the subject components should be within scope requiring aging management, provided the pressurizers are designed with such components. In its response dated April 15, 2002, the applicant stated that the pressurizer seismic lugs are integral attachments to the pressurizer and are included in LRA Table 3.1-1 as "Reactor Vessel and Pressurizer Integral Attachments" (page 3.1-6, row 2). The valve support brackets are not used at McGuire and Catawba to provide support for safety and relief valves. The safety and relief valves are supported by pipe supports that attach to the pressurizer cavity wall. The staff agrees that the valve support brackets are outside the scope of license renewal, because they do not perform an intended function under 10 CFR 54.4(a)(1) and are not necessary to demonstrate compliance with any requirements referenced in 10 CFR 54.4(a)(3). The staff did not identify any omissions.

2.3.1.3.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1.3 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to the requests for additional information, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the pressurizer system and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR Part 54.4(a) and 10 CFR Part 54.21(a)(1).

*2.3.1.4 Reactor Vessel and Control Rod Drive Mechanism (CRDM) Pressure Boundary*

In the McGuire and Catawba LRA, Section 2.3.1.4, "Reactor Vessel and Control Rod Drive Mechanism Pressure Boundary," the applicant describes the reactor vessel and CRDM and associated components that are within the scope of license renewal and subject to an AMR for both McGuire and Catawba. The reactor vessel and CRDM and associated components are similar for both facilities, and unless otherwise specified, the information provided below is applicable to the McGuire and Catawba. The McGuire UFSAR Section 5.4, "Reactor Vessel," and the Catawba UFSAR Section 5.3, "Reactor Vessel," provide additional information concerning the McGuire and Catawba reactor vessel and associated components, respectively.

2.3.1.4.1 Technical Information in the Application

The reactor vessel is cylindrical, with a welded hemispherical bottom head and a removable, flanged and gasketed, hemispherical upper head. The vessel contains the core, core supporting structures, control rods and other parts directly associated with the core. The upper (closure) head contains 82 penetrations (78 for CRDM and 4 auxiliary head adapters). The vessel has inlet and outlet nozzles located in a horizontal plane just below the reactor vessel flange but above the top of the core. Coolant enters the vessel through the inlet nozzles and flows down the annulus between the core barrel and the vessel wall, turns at the bottom, and flows up through the core to the outlet nozzles.

The bottom head of the vessel contains 58 penetrations for connection and entry of the nuclear incore instrumentation. Each penetration consists of a tubular member made of Inconel. Each tube is attached inside the bottom head by a partial penetration weld. Stainless steel conduits extend from the Inconel penetration in the bottom head of the reactor vessel down through the concrete shield area and up to a thimble shield table. The retractable thimble tubes, which travel within the conduit, are closed at the leading ends, are dry inside, and serve as the pressure barrier between the reactor water pressure and the reactor building atmosphere. Mechanical seals between the retractable thimbles and the conduits are provided at the seal table.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for all four of the McGuire and Catawba reactor vessels are listed in Table 3.1-1 of the LRA. The component types that were identified in the table include closure head dome, flange, ring and vessel flange, upper (nozzle) shell, primary inlet and outlet nozzles, inlet and outlet nozzle safe ends, intermediate shell, lower shell, bottom head spherical ring, dome, CRDM housings, upper head injection (UHI) auxiliary head adapter flange, head vent penetration, thimble assembly, bottom-mounted instrumentation (BMI) tubes (penetrations), thimble guide tubes, thimble seal table, and core support pads.

2.3.1.4.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the reactor vessel and CRDM components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba for the reactor vessel, CRDM, and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 systems, structures, and components 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.

Wastage of carbon steel induced by borated water leakage through the pressure boundary in PWRs is a potential aging degradation for the components. Reactor vessel head lifting lugs are considered to be such components requiring aging management. However, if the components are currently covered under the Fluid Leak Management Program, then they may not require additional aging management. It appears that the subject components were not discussed in the LRA. By letter dated January 28, 2002, the staff requested, in RAI 2.3.1-1, the applicant to verify whether the components are within the surveillance program; and if not, to provide an explanation.

In its response dated April 15, 2002, the applicant stated that the reactor vessel head lifting lugs are considered to be a part of the exterior surfaces of RCS pressure boundary components that are listed in Table 3.1-1 (page 3.1-5, row 1) of the LRA. The aging effect of the reactor vessel head lifting lugs is managed by the Fluid Leak Management Program, which is described in Appendix B, Section B.3.15 of the LRA. The Fluid Leak Management Program is credited for managing loss of material due to boric acid wastage for alloy steel components such as the reactor vessel head lifting lugs. The staff agrees that the lifting lugs are within the scope of license renewal and are subject to the Fluid Leak Management Program, since the lugs are considered to be piece parts of the RCS pressure boundary. The staff did not identify any omissions.

2.3.1.4.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1.4 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to staff's RAI, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the reactor vessel and CRDM system and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR Part 54.4(a) and 10 CFR Part 54.21(a)(1).

*2.3.1.5 Reactor Vessel Internals (RVI)*

In the McGuire and Catawba LRA, Section 2.3.1.5, "Reactor Vessel Internals," the applicant describes the RVI and associated components that are within the scope of license renewal and subject to an AMR for McGuire and Catawba. The RVI and associated components are similar for both facilities, and unless otherwise specified, the information provided below is applicable to the McGuire and Catawba. The McGuire UFSAR Section 4.2.2, "Reactor Vessel Internals," and the Catawba UFSAR Section 3.9.5, "Reactor Vessel Internals," provide additional information concerning the McGuire and Catawba reactor vessel internals and associated components, respectively.

2.3.1.5.1 Technical Information in the Application

The components of the reactor internals are divided into three parts consisting of the lower core support structure (including the entire core barrel and neutron shield pad assembly), the upper core support structure, and the in-core instrumentation support structure. The RVI support the core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and CRDMs, direct coolant flow past the fuel elements and to the pressure vessel head, provide gamma and neutron shielding, and provide guides for the in-core instrumentation. The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for all four of the McGuire and Catawba RVI are listed in Table 3.1-1 of the LRA. The component types that were identified in the table include upper support assembly, upper support column, upper support column bolts, upper core plate, upper core plate alignment pins, fuel alignment pins, hold-down spring, thermocouple column and crossrun assemblies, 17x17 and 15x15 guide tube assembly, UHI flow columns, core barrel flange, core barrel outlet nozzles, neutron panels, irradiation specimen holder, fasteners, baffle and former plates, baffle bolts, lower core plate, lower support column bolts, lower support plate, lower core support columns, radial keys and fasteners, clevis inserts and fasteners, and bottom-mounted instrumentation.

2.3.1.5.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the RVI components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba for the RVI and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 systems, structures, and components 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.

Section 3.9.1.3, page 3.9-4 of McGuire UFSAR states that the diffuser plate was relied upon when performing the dynamic system load analyses for reactor internals at McGuire to determine the behavior of lower structures when subjected to loads. Furthermore, based on past license renewal reviews of Westinghouse plants, the staff believes that the diffuser plate (provided there is one) should be within the scope requiring aging management because the component provides the safety function of structural and/or functional support for in-scope equipment, and/or provides flow distribution. By letter dated January 28, 2002, the staff requested, in RAI 2.3.1-3, the applicant to confirm whether the subject component was identified to be within scope requiring aging management for McGuire; and if not, to explain why. The staff further requested that the applicant update the UFSAR to correct the information. In its response dated April 15, 2002, the applicant stated that Duke's investigation in preparing the response to RAI 2.3.1-3 had revealed that the summary analysis provided in UFSAR Section 3.9.1.3 of the McGuire UFSAR is a generic analysis that was provided by Westinghouse, the McGuire nuclear steam supply system vendor. The analysis described in the UFSAR reflects an earlier Westinghouse plant design that bounds the McGuire design. A review of plant drawings and communications between the applicant and Westinghouse confirmed that the McGuire RVI do not have a diffuser plate. The applicant stated that a Problem Investigation Process (PIP) report was initiated to clarify McGuire UFSAR Section 3.9.1.3. The applicant's assessment is acceptable, and the staff did not identify any omissions.

2.3.1.5.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1.5 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to the requests for additional information, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the RVI and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR Part 54.4(a) and 10 CFR Part 54.21(a)(1).

*2.3.1.6 Steam Generator*

In the McGuire and Catawba LRA, Section 2.3.1.6, "Steam Generator," the applicant describes the SG and associated components that are within the scope of license renewal and subject to an AMR for McGuire and Catawba. The SGs and associated components are similar for both facilities, and unless otherwise specified, the information provided below is applicable to the McGuire and Catawba. The McGuire UFSAR Section 5.5.2, "Steam Generator," and the Catawba UFSAR Section 5.4.2, "Steam Generator," provide additional information concerning the McGuire and Catawba SGs and associated components, respectively.

2.3.1.6.1 Technical Information in the Application

The replacement steam generators (RSGs) at McGuire 1 and 2 and Catawba 1 were manufactured by Babcock & Wilcox International in Cambridge, Ontario, Canada. The McGuire 1 SGs were replaced in May 1997, and the McGuire 2 SGs were replaced in December 1998. The Catawba 1 SGs were replaced in October 1996. For Catawba 2, the SGs that were installed during original construction have not been replaced.

All SGs at both stations are vertical shell and U-tube evaporators with integral moisture separating equipment. Reactor coolant flows through the inverted U-tubes, entering and leaving through nozzles equipped with stainless steel safe ends located in the hemispherical bottom head of the SG. Steam is generated on the shell side of the tubes and flows upward through the moisture separators to the outlet nozzle at the top of the SG. Feedwater flows directly into a downcomer section and is mixed with saturated recirculation flow before entering the tube bundle for the replacement SGs. The Catawba 2 SGs are equipped with a preheater and feedwater flow restriction, with main feedwater delivered just above the tube sheet. Subsequently, the water-steam mixture flows upward through the tube bundle and into the steam drum section. Centrifugal moisture separators, located above the tube bundle, remove most of the entrained water from the steam.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for all 16 of the McGuire and Catawba SGs are listed in Table 3.1-1 of the LRA. The component types that were identified in the table include primary head/cladding, primary nozzle closure rings, secondary manway, secondary manway covers, handhole covers, handhole pad, tubesheet/primary and secondary cladding, tubes/plugs, primary nozzles, primary nozzle safe ends, primary manway cover, plate/diaphragm, primary divider plate, steam drum boiler shells, steam dome conical shells, handhole, handhole diaphragm, small nozzles, primary manway and manway insert, primary chamber drain and coupling, feedwater thermal sleeve, feedwater limiter, steam outlet nozzle, flow restriction, steam outlet nozzle safe end, auxiliary feedwater nozzle, main feedwater nozzle, steam outlet nozzle, auxiliary feedwater nozzle safe end, and auxiliary feedwater distribution system.

2.3.1.6.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the SG components and supporting structures within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba for the SG and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 systems, structures, and components 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.

Table 3.1-1 of the LRA identifies components for the SGs that require AMR. The following components were not listed in the table-anti-vibration bars, stay rod, tube bundle wrapper, and tube support plates. Based on past LRA reviews for the Westinghouse plants, and on the information provided in McGuire and Catawba UFSARs, the staff believes that these components perform the intended function of providing structural and/or functional support for in-scope equipment, namely the SG tubes, and, therefore, should be within the scope of license renewal and subject to an AMR. By letter dated January 28, 2002, the staff requested, in RAI 2.3.1-4, the applicant to determine if the intended function of the above components to provide structural and/or functional support for the SG tubes is within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) by confirming that none of the above-mentioned components in McGuire and Catawba units are credited for preventing tube failure during seismic events or during a main steam-line break accident. In its response dated April 15, 2002, the applicant stated that upon further review, Duke concluded that tube support structures on the secondary side of the SGs are within scope and subject to AMR. The tube support structures include items such as lattice grid support plates, U-bend anti-vibration bars, the shroud, lattice ring, and U-bend arch bars for the replacement SGs at McGuire 1 and 2 and Catawba 1. For Catawba 2 SGs, items such as anti-vibration bars, stay rods, tube bundle wrapper, and tube support plates are included. The applicant further stated that the items for all four units are included as "tube supports." The AMR results for the tube supports, as proposed in the RAI response, are provided below and used to supplement Table 3.1.1 of the LRA—

- component type-SG tube supports
- component function-support
- material-alloy steel, stainless steel, carbon steel
- environment-treated water
- aging effect-cracking, loss of material
- aging management programs and activities-Chemistry Control Program, SG Surveillance Program

Because the applicant agreed that the SG subcomponents described in RAI 2.3.1-4 are within the scope of license renewal, the applicant's assessment of scoping and screening of SG sub-components is acceptable. The staff did not identify any additional omissions. The adequacy of the proposed aging management programs and activities for the tube supports is discussed in Section 3.1.5.2 of this SER.

2.3.1.6.3 Conclusions

The staff identified that the applicant did not include the tube supports of the SGs as within the scope of license renewal and subject to an AMR for McGuire and Catawba. However, the

applicant subsequently added the SG tube supports to the scope of components subject to an AMR and provided the AMR results to the staff for review. The staff's evaluation of the AMR results for the SG support components is provided in Section 3.1.5.2 of this SER. Since no additional omissions were identified, the staff concludes that, on the basis of its review of the information presented in Section 2.3.1.6 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to RAIs, there is reasonable assurance that the applicant adequately identified those portions of the SG and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR Part 54.4(a) and 10 CFR Part 54.21(a)(1).

## 2.3.2 System Scoping and Screening Results: Engineered Safety Features

In Section 2.3.2, "Engineered Safety Features," of the McGuire and Catawba LRA, the applicant described the SSCs of the engineered safety features (ESFs) that are subject to an AMR for license renewal.

### *2.3.2.1 Annulus Ventilation System*

In Section 2.3.2.1 of the LRA titled, "Annulus Ventilation System," the applicant identified portions of the annulus ventilation (VE) system and its components that are within the scope of license renewal and subject to AMR. The applicant noted in Section 2.3.2.1 of the LRA that the VE system is further described in Section 6.2 of both the McGuire and Catawba UFSARs.

The applicant evaluated component supports for heating, ventilation, and air-conditioning ductwork listed in Table 3.5-3 of the LRA. The applicant evaluated electrical components that support the operation of the VE system in Section 2.1.2 of the LRA. The staff's scoping evaluation of structures and component supports is provided in Section 2.4 of this SER. The staff's evaluation of electrical components and instrumentation and controls in the VE system is documented in Section 2.5 of this SER.

#### 2.3.2.1.1 Technical Information in the Application

The independent VE system for all four units is considered an engineered safety feature (ESF). Each VE system has redundant trains consisting of a makeup air supply fan, a moisture eliminator, a filter train and associate piping, valves, and controls as necessary to accomplish the design bases. All major annulus ventilation components are located in the auxiliary building.

Two 100 percent capacity VE system exhaust fans and corresponding filtration (FI) trains are provided for each unit. The fans and filtration trains are supplied with both normal and class 1E emergency power. The moisture eliminator consists of a mechanical demister and a heater, which are designed to limit the relative humidity entering the filter train to below 70 percent, assuming intake air at 100 percent relative humidity. Each carbon filter is sized to accommodate the fission products released into the annulus following any of the postulated accidents. If one ventilation subsystem fails, the transfer of function to the other ventilation subsystem is performed manually from the control room by the operator.

The VE system functions to discharge sufficient air from the annulus to achieve and maintain a negative pressure with respect to the containment and the outside atmosphere following a

loss-of-coolant accident (LOCA). In order to mix the inleakage in as large a volume as possible, a large flow of air is displaced from the upper level of the annulus, passed through the filter, and returned to the annulus at a low level. The applicant stated in the LRA that the VE system is further described in Section 6.2 of the McGuire and Catawba UFSARs. In Section 2.3.2.1 of the LRA, and Sections 6.1.8 and 9.4.9.1 of the McGuire and Catawba UFSARs, respectively, the applicant identified the following intended functions of the McGuire and Catawba VE system based on 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2)—

McGuire

Section 2.3.2.1 of the LRA—

- to create and maintain a negative pressure zone in the annular space between the steel primary containment and reactor building (secondary containment)
- to prevent the leakage of radioisotopes through the reactor building and into the environment, following a LOCA
- to maintain containment isolation integrity

Section 6.1.8 of the UFSAR—

- to maintain a post-accident negative pressure in the annulus between the containment and the reactor building, and collect and filter gaseous leakage from the containment during accident conditions
- to produce a slight negative pressure within the annulus, thus preventing outleakage and relieving the post-accident thermal expansion of air in the annulus
- to keep outleakage minimal (the reactor building also serves as a protective structure)
- to collect, delay, and filter gases leaking from the containment vessel

Catawba

Section 2.3.2.1 of the LRA—

- to limit operator and site boundary dose, following a design basis accident, to within the guidelines specified in 10 CFR Part 100
- to provide long-term fission product removal capability within the annulus through holdup and filtration

Section 9.4.9.1 of the UFSAR—

- to limit operator and site boundary doses following a design basis accident (DBA) to within 10 CFR 100 guidelines
- to produce and maintain a negative pressure of 0.25 inches water gauge throughout the annulus
- to reduce the concentration of radioactivity (specifically radioiodines) in the air within, and discharged from, the annulus through filtration and recirculation of annulus air
- to provide long-term fission product removal capacity within the annulus through holdup, decay, and filtration
- to minimize the release of radioactivity (specifically radioiodines) from the containment to the environment following a design basis LOCA

On the basis of the intended functions identified above for the McGuire and Catawba VE systems, the portions of these systems that were identified by the applicant as within the scope of the LRA include all VE system safety-related components (electrical, mechanical, and instruments). The applicant described its methodology for identifying the mechanical components subject to an AMR in Section 2.1.2.1.2 of the LRA. On the basis of this methodology, the applicant identified the portions of the VE system that are within scope on the flow diagrams listed in Section 2.3.2.1 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical components and component types subject to an AMR that are within the evaluation boundaries highlighted on the flow diagrams, and identified their intended functions. The applicant provided this list in Table 3.2-1 of the LRA.

The following component types are identified in Table 3.2-1 of the LRA as within the scope of license renewal and subject to an AMR-air flow monitors, ductwork, filters, pipe (McGuire only), valve bodies, and tubing. The applicant further noted in Table 3.2-1 of the LRA that the VE system pressure boundary function is the only applicable intended function of annulus mixing components that are subject to an AMR.

2.3.2.1.2 Staff Evaluation

To verify that the applicant identified the components of the VE 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), the staff reviewed the flow diagrams listed in Section 2.3.2.1 of the LRA that show the evaluation boundaries for the highlighted portion of the VE system that are within scope, and Table 3.2-1 of the LRA, which lists the mechanical components and the applicable intended functions that are subject to an AMR. The staff also reviewed UFSAR Sections 6.1.8 and 9.4.9 to determine if there were any portions of the VE system that met the scoping criteria in 10 CFR 54.4(a), but were not identified as within the scope. The staff also reviewed the McGuire and Catawba UFSARs to determine if any safety-related system functions were not identified as intended functions in the LRA, and to determine if any structures or components that have intended functions were omitted from the scope of structures or components that require an AMR. The staff compared the functions described in the UFSARs to those identified in the LRA.

The applicant identified the structures and components subject to an AMR for the VE system using the screening methodology described in Section 2.1 of the LRA and listed them in Table 3.2-1 of the LRA. The staff evaluated the scoping and screening methodology in Section 2.1 of this SER. The staff sampled components from Table 3.2-1 of the LRA to verify that the applicant did identify the components subject to an AMR. The staff also sampled the structures and components that were within the scope of the LRA but not subject to an AMR. Based on this sample, the staff verified that these structures and components perform their intended functions without moving parts or without a change in configuration or properties, and are not subject to replacement on the basis of a qualified life or specified time period.

To ensure that those portions of the VE system excluded from the scope of license renewal do not perform any intended functions, the staff requested additional information based on a review of the UFSAR and LRA descriptions. The staff noted that Section 2.3.2.1 of the LRA provides a summary description of the system functions and a listing of flow diagrams. The flow diagrams highlight the evaluation boundaries, and Table 3.2-1 of the LRA tabulates the components within

the scope and subject to an AMR for the VE system. The corresponding drawings and UFSARs, however, show additional components that were not listed in Table 3.2-1 of the LRA.

The staff noted that the applicant did not identify housings for active components that require an AMR. The determination should consider whether failure of the housing would result in a failure of the associated active component to perform its intended function, and whether the housing meets the long-lived and passive criteria as defined in the rule.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-1, specific information concerning the exclusion of fan housings from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that cooling fans are not included in the AMR results tables in the LRA. The applicant added that cooling fans, without subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and determined that the applicant's basis for excluding fan housings is not consistent with the license renewal rule because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are, therefore, within the scope of license renewal. Furthermore, because the fan housings are passive long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-1.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-2, specific information concerning the exclusion of damper housings from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that dampers are not included in the AMR results tables in the LRA. The applicant added that ventilation dampers, without sub-component exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and has determined that the applicant's basis for excluding damper housings is not consistent with the license renewal rule because the housings are relied upon to maintain the pressure boundary integrity (as are valve bodies and pump casings) and are, therefore, within the scope of license renewal. Furthermore, because the damper housings are passive long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-2.

In its response to open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the annulus ventilation system fan and damper housings that are in scope at McGuire and Catawba. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open items 2.3-1 and 2.3-2. The applicant indicated that the aging effects will be adequately managed such that the intended functions of the fans and dampers will be maintained consistent with the current licensing basis for the period of extended operation. The staff's evaluation of the AMR results is documented in Section 3.2.1.2 of this SER. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-4, specific information concerning the exclusion of building sealants from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that it does not define materials such as sealants to be structures or components. The applicant stated the pressure boundary function is addressed by technical specification surveillance testing. However, the applicant did not indicate that any of the technical specificaiton surveillance requirements (TSSRs) listed in its response were credited for aging management (and identified as AMPs). Nor did the applicant

furnish a description of or information pertaining to a TS surveillance AMP (including discussion of the 10 elements of the AMP) for the staff's review.

On page 2.1-24 of the LRA, the applicant stated that "seals associated with maintaining pressure boundary are limited to the divider barrier seals in the reactor building." Since the applicant does not discuss the treatment of structural sealants other than the divider barrier seal, it is not clear to the staff that building (structural) sealants were considered during an AMR of the structure (building) for which they are a subcomponent. Furthermore, according to page 3.5-10 of the LRA, the Inspection Program for Civil Engineering Structures and Components is credited by the applicant to monitor the aging of building concrete structural components (reinforced concrete beams, columns, floor slabs, and walls). According to Section B.3.21, of Appendix B of the LRA, the scope of the Inspection Program for Civil Engineering Structures and Components does not include structural sealants. Table 2.1-3, on page 2.1-15 of the SRP-LR, states that an applicant's structural AMP is expected to address structural sealants "with respect to an AMR program." The intent of this statement is that an applicant's structural AMP is expected to manage or monitor the aging effects of the structure and associated sub-components that are identified during the AMR. The basis for this SRP guidance is documented in the summary (issued January 21, 2000) of a December 8, 1999, meeting to discuss the staff's position on the treatment of consumables. This summary clearly states, on page 3, that structural sealants would be implicitly included at the component level and considered during the AMR. Since the structural AMP identified for the concrete structural components does not address structural sealants, and since that applicant did not identify the TS surveillances listed in its response as AMPs, or provide appropriate information to support the staff's review of these surveillances as AMPs, the staff characterized this issue as SER open item 2.3-3.

In its response to this open item, dated October 28, 2002, the applicant credited a visual inspection of the structural sealant used to maintain ventilation pressure boundary integrity of the control room area, emergency core cooling pump rooms, annulus, and fuel handling building. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open item 2.3-3. The staff's evaluation of the Ventilation Area Pressure Boundary Sealants Inspection Program is provided in Section 3.0.3.19 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-5, specific information concerning the exclusion of passive components associated with ductwork from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant identified these passive components as subcomponents of ductwork. The applicant also stated that ventilation grilles were installed only for aesthetic purposes and perform no intended license renewal function. Because passive components associated with ventilation ductwork referenced in RAI 2.3-5 perform no intended function, the staff agrees that they are not within the scope of license renewal.

Some components that are common to many systems, including the VE system, have been evaluated separately by the applicant in LRA Section 2.1.2.1.2 as "replace on condition" commodities. The staff's evaluation of applicant's treatment of these consumables is documented in Section 2.1.3.2.1 of this SER.

In Section 2.4.3 of this report, the staff evaluated component supports for piping, cables, and equipment, which are discussed in LRA Section 2.4, "Scoping and Screening Results: Structures." In Section 2.5 of this report, the staff evaluated electrical components that

support the operation of the VE system, which are discussed in LRA Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Controls." The VE system instrumentation lines are evaluated with the VE system and are listed in Table 3.2-1 of the LRA as tubing.

The staff reviewed the LRA, supporting information in the UFSAR, and the applicant's responses to RAIs. In addition, the staff sampled several components from the VE system flow diagram, as identified in LRA Section, to determine whether the applicant properly identified the components within scope and subject to an AMR. No omissions were identified, except as identified in the RAIs.

2.3.2.1.3 Conclusions

On the basis of its review, and with the resolution of open items identified in this SER section, the staff has reasonable assurance that the applicant has adequately identified the VE system structures and components 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, respectively.

*2.3.2.2 Containment Isolation System*

In Section 2.3.2.2 of the LRA, the applicant described the systems isolated by the containment isolation system and the components therein which are within the scope of license renewal and subject to an AMR. The containment isolation system is further described in Section 6.2.4 of the McGuire and Catawba UFSARs.

2.3.2.2.1 Technical Information in the Application

The containment isolation system is an ESF with the intended function of isolating all nonessential fluid-bearing lines penetrating the containment in order to prevent the uncontrolled or unmonitored release of radioactivity to the environment. The applicant identified the following 12 systems as being isolated by the containment isolation system—

- breathing air system
- containment air release and addition system
- containment hydrogen sample and purge system (Catawba only)
- containment purge ventilation system
- containment ventilation cooling water system (McGuire only)
- conventional chemical addition system (McGuire only)
- equipment decontamination system
- ice condenser refrigeration system
- makeup demineralized water system
- station air system
- steam generator blowdown recycle system
- steam generator wet lay-up recirculation system

Based on the intended function of the containment isolation system identified above, the applicant identified the following five component types in this system as within the scope of license renewal and subject to an AMR-valve bodies, piping, tubing, orifices, and annubars.

The applicant further identified the intended functions of these component types to be maintaining the integrity of the containment isolation system pressure boundary.

2.3.2.2.2 Staff Evaluation

The staff reviewed Section 2.3.2.2 of the LRA, and the associated piping and instrumentation diagrams (P&IDs) to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the containment isolation system that are within the scope of license renewal in accordance with 10 CFR 54.4. The staff then reviewed the AMR results provided in Table 3.2-2 of the LRA to determine whether the applicant appropriately identified the components belonging to the containment isolation system that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). In order to perform a conservative review, the staff focused on those components of the containment isolation system that were not identified as meeting the above requirements. The staff also reviewed Section 6.2.4 of the McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted from Section 2.3.2.2 of the applicant's LRA.

As discussed below, the applicant considered within the scope of license renewal only the components of the containment isolation system which function as a pressure boundary to support containment isolation. The staff finds this approach to be acceptable because the 12 systems included in the containment isolation system are nonessential except for their containment isolation function. In its initial review, however, the staff identified seven instances on five containment isolation system piping and instrumentation diagrams where piping and valve bodies that appeared to serve as a pressure boundary for the containment isolation intended function had not been highlighted as within the scope of license renewal. As detailed in a telecommunication summary dated November 14, 2001, the applicant confirmed that these seven license renewal scoping boundaries had been incorrectly highlighted on the diagrams, and that the piping and valve bodies inadvertently omitted were actually considered to be within the scope of license renewal and subject to an AMR. In the same telecommunication summary, the staff also questioned whether the Catawba containment hydrogen sample and purge system was used to provide post-accident containment hydrogen concentration samples on which the manual operation of the containment hydrogen recombiners would be based. The applicant indicated that the containment hydrogen sample and purge system was not credited for this function, and that the safety-related hydrogen analyzers (which the applicant classified as part of the miscellaneous instrumentation system, reviewed in Section 2.3.2.9 of this SER) are credited with providing an indication of post-accident hydrogen concentration. The staff finds the applicant's responses satisfactory because they (1) support the conclusion that all components required for the containment isolation intended function are considered within the scope of license renewal, (2) support the conclusion that the twelve non-essential systems isolated by the containment isolation system do not have intended functions other than containment isolation, and (3) are consistent with the general information and descriptions concerning the containment isolation system provided in the LRA.

2.3.2.2.3 Conclusions

The staff concludes that, for both McGuire and Catawba, there is reasonable assurance that the applicant has appropriately identified the components of the containment isolation system that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

*2.3.2.3 Containment Air Return Exchange and Hydrogen Skimmer System*

In Section 2.3.2.3 of the LRA, the applicant described the containment air return exchange and hydrogen skimmer system and the components therein which are within the scope of license renewal and subject to an AMR. This system is further described in Section 6.2 of the McGuire and Catawba UFSARs.

2.3.2.3.1 Technical Information in the Application

The containment air return exchange and hydrogen skimmer system is an ESF with the following three intended functions (1) maintaining containment pressure less than its design value during a postulated high-energy line break (HELB) by recirculating air from the upper containment to the lower containment, (2) ensuring the hydrogen concentration remains less than the flammability limit following a postulated loss-of-coolant accident by preventing hydrogen pocketing in dead-ended compartments within containment, and (3) maintaining containment isolation capability for the system piping penetrating containment. The containment air return portion of this system employs two redundant air return fans, dampers, and ductwork (Catawba only) to recirculate air from upper containment to lower containment in response to a postulated high-energy line break. The hydrogen skimmer portion of this system employs two redundant hydrogen skimmer fans, piping, dampers (McGuire only), and expansion joints (Catawba only) to skim hydrogen from compartments in which hydrogen may accumulate following a postulated loss-of-coolant accident. The pressure boundary of the hydrogen skimmer portion of this system consists of piping, rather than ductwork, to prevent rupture and consequent ice condenser bypass leakage following a postulated accident.

Based on the three intended functions of the containment air return exchange and hydrogen skimmer system identified above, the applicant identified the following five component types of this system as within the scope of license renewal and subject to an AMR-piping, tubing, valve bodies, ductwork (Catawba only), and expansion joints (Catawba only). The applicant further identified the intended functions of these component types to be maintaining the integrity of the containment air return exchange and hydrogen skimmer system pressure boundary.

2.3.2.3.2 Staff Evaluation

The staff reviewed Section 2.3.2.3 of the LRA, and the associated piping and instrumentation diagrams, to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the containment air return exchange and hydrogen skimmer system that are within the scope of license renewal in accordance with 10 CFR 54.4. The staff then reviewed the AMR results provided in Table 3.2-3 of the LRA to determine whether the applicant appropriately identified the components belonging to the containment air return exchange and hydrogen skimmer system that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). In order to perform a conservative review, the staff focused on those components of the containment air return exchange and hydrogen skimmer system that were not identified as meeting the above requirements. The staff also reviewed Section 6.2 of the McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted from Section 2.3.2.3 of the applicant's LRA.

As described in detail below, the staff questioned the applicant's omission from the scope of license renewal of certain ductwork (McGuire only) in the containment air return portion of this

system. Additionally, the staff questioned the applicant's apparent omission from the scope of license renewal of the containment hydrogen recombiners, and the omission of certain piping in the hydrogen skimmer portion of the system. Finally, the staff questioned the applicant's omission of the fan bodies and damper bodies throughout the containment air return exchange and hydrogen skimmer system.

By letter dated January 23, 2002, the staff requested, in RAI 2.3.2.3-1, the applicant to indicate whether or not certain ductwork (McGuire only) performs the intended function of serving as a passive pressure boundary in the containment air return portion of this system. In its response dated April 15, 2002, the applicant stated that the ductwork identified by the staff, which is indicated on the piping and instrumentation diagrams for the McGuire containment air return system, does not physically exist at the plant. In actuality, the containment air return fans and dampers at McGuire are bolted together directly without intervening ductwork and mounted directly upon the floor of the upper containment. Therefore, staff finds the applicant's exclusion of containment air return ductwork from the scope of license renewal to be acceptable for McGuire.

By letter dated January 23, 2002, the staff also requested, in RAI 2.3.2.3-3, additional information to address the apparent omission of the containment hydrogen recombiners and any supporting mechanical components from the scope of license renewal. In its response dated April 15, 2002, the applicant stated that the hydrogen recombiners are electrical (rather than mechanical) components, but that they were considered within the scope of license renewal for McGuire and Catawba. The applicant further stated that, in accordance with 10 CFR 50.49, the recombiners are included within the Environmental Qualification Program at each site, and, as they are subject to replacement based on a qualified lifetime, they are not subject to an AMR. The staff finds the applicant's response to be acceptable because (1) it is consistent with the regulatory guidance provided in the Standard Review Plan for License Renewal and the Generic Aging Lessons Learned Report, and (2) it indicates that the hydrogen recombiners are addressed in the Electrical and Instrumentation and Controls section of the LRA. The staff's evaluation of the Electrical and Instrumentation and Controls section is documented in Section 2.5 of this SER.

The staff asked why the non-safety-related carbon steel piping used to skim hydrogen from various containment compartments was not considered to be within the scope of license renewal for McGuire and Catawba. As documented in a telecommunication summary dated November 14, 2001, the applicant explained that the piping not highlighted was embedded in concrete, and that a breach of the embedded piping would not result in a loss of the intended pressure boundary function of the piping. The applicant stated that the surrounding concrete would alternately provide a hydrogen skimmer system flow-path, and that this concrete is a safety-related structure that is within the scope of license renewal and subject to an AMR. Although the staff recognizes that the gaseous permeability of concrete is greater than that of carbon steel, the staff finds the applicant's response to be satisfactory because reasonably postulated localized failures of the hydrogen skimmer system piping would not be expected to have a noticeable effect on the system's performance due to the relatively small differential pressures postulated between the hydrogen skimmer system and the ambient containment atmosphere, and to the high quality of the structural concrete used in the containment design. Although the applicant has not demonstrated that a complete disintegration of the embedded hydrogen skimmer system would not degrade the hydrogen skimmer system's performance, the staff does not consider complete disintegration to be a reasonably postulated failure because the

secure and relatively benign internal and external environments for embedded carbon steel piping used in ventilation systems is not expected to promote rapid and undue aging effects. Therefore, the staff has concluded that (1) the applicant has appropriately addressed 10 CFR 54.4(a)(2) for the embedded piping in the hydrogen skimmer system, and (2) the applicant's response is consistent with the general information and descriptions provided in the LRA.

By letter dated January 23, 2002, the staff requested, in RAIs 2.3-1 and 2.3-2, additional information to determine whether fan and damper housings in the containment air return exchange and hydrogen skimmer system perform the intended function of serving as a passive pressure boundary. In its response dated April 15, 2002, the applicant indicated that fan and damper bodies for ventilation systems at McGuire and Catawba were not subject to an AMR due to specific exceptions stated in 10 CFR 54.21(a)(1)(i). The staff finds the applicant's response to be unacceptable because it interprets 10 CFR 54.21(a)(1)(i) in a manner that is contrary to the basis for this regulation. Although fans and dampers are considered to be active components, their bodies are passive structural components that perform an intended pressure boundary function (i.e., the pressure boundary provided by the fan bodies and damper bodies is necessary for the success of these components' associated active functions). Therefore, the staff considers that (1) all of the fan bodies and damper bodies that perform an intended pressure boundary function for the containment air return exchange and hydrogen skimmer system are within the scope of license renewal and subject to an AMR, and (2) the applicant's basis for excluding these fan bodies and damper bodies is not adequate since it inherently contradicts the requirements of 10 CFR 54.21(a)(1)(i). This issue was characterized as SER open item 2.3-1 (fan housings) and SER open item 2.3-2 (damper housings).

In its response to SER open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the containment air return exchange and hydrogen skimmer system fan and damper housings that are in scope at McGuire and Catawba. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open items 2.3-1 and 2.3-2. The applicant indicated that the aging effects will be adequately managed such that the intended functions of the fans will be maintained consistent with the current licensing basis for the period of extended operation. The staff's evaluation of the AMR results is documented in Section 3.2.3.2 of this SER. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER.

2.3.2.3.3 Conclusions

With the resolution of SER open items 2.3-1 and 2.3-2 concerning the fan and damper housings in the containment air return exchange and hydrogen skimmer system, the staff concludes that, for both McGuire and Catawba, there is reasonable assurance that the applicant has appropriately identified the components of this system that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

*2.3.2.4 Containment Spray System*

In Section 2.3.2.4 of the LRA, the applicant described the containment spray system (CSS) and the components therein which are within the scope of license renewal and subject to an AMR.

This system is further described in Section 6.5 of the McGuire UFSAR and Section 6.2.2 of the Catawba UFSAR.

2.3.2.4.1 Technical Information in the Application

The containment spray system is an ESF with the following three intended functions—(1) removing thermal energy from the post-accident containment atmosphere to help maintain containment pressure below its design value, (2) removing fission product iodine from the post-accident containment atmosphere, and (3) suppressing steam partial pressure in the upper containment volume from operating deck leakage due to a loss-of-coolant accident. The containment spray system consists of two redundant trains, each with a motor-driven pump, piping, a heat exchanger, two spray headers, and a residual heat removal (RHR) spray header.

Based on the three intended functions identified above, the applicant identified the following 10 component types of the containment spray system as within the scope of license renewal and subject to an AMR-flow orifices, heat exchanger channel heads, heat exchanger shells, heat exchanger tubes, heat exchanger tube sheets, piping, pump casings, spray nozzles, tubing, and valve bodies. The applicant further identified the intended functions of these component types to be maintaining the integrity of the containment spray system pressure boundary, throttling flow, transferring heat, and/or inducing spray flow.

2.3.2.4.2 Staff Evaluation

The staff reviewed Section 2.3.2.4 of the LRA, and the associated piping and instrumentation diagrams, to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the containment spray system that are within the scope of license renewal in accordance with 10 CFR 54.4. The staff then reviewed the AMR results provided in Table 3.2-4 of the LRA to determine whether the applicant appropriately identified the components belonging to the containment spray system that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). In order to perform a conservative review, the staff focused on those components of the containment spray system that were not identified as meeting the above requirements. The staff also reviewed Section 6.5 of the McGuire UFSAR, and Section 6.2.2 of the Catawba UFSAR, and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted from Section 2.3.2.4 of the applicant's LRA.

The applicant considered within the scope of license renewal all of the components of the containment spray system which support the performance of the system's three intended functions, including the unisolable portions of nonessential miscellaneous piping lines (e.g., fill, drain, and vent lines) connected to essential parts of the system. These unisolable portions do not serve any intended function other than maintaining the pressure boundary of the containment spray system. The staff finds this approach to be acceptable because it is consistent with the scoping criteria of 10 CFR 54.4. However, the staff questioned the applicant's omission of five capped drain and vent lines connected to the main containment spray discharge lines which were not highlighted as within the scope of license renewal on two of the containment spray system piping and instrumentation diagrams. As detailed in a telecommunication summary dated November 14, 2001, the applicant confirmed that these five capped piping lines were considered to be within the scope of license renewal and should have been highlighted. The staff finds the applicant's response satisfactory because (1) it is

consistent with license renewal scoping regulation, 10 CFR 54.4, and (2) it is consistent with the general information and descriptions provided in the LRA concerning the containment isolation system.

2.3.2.4.3 Conclusions

The staff concludes that, for both McGuire and Catawba, there is reasonable assurance that the applicant has appropriately identified the components of the containment spray system that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

*2.3.2.5 Containment Valve Injection Water System*

In Section 2.3.2.5 of the LRA, the applicant described the containment valve injection water system and the components therein which are within the scope of license renewal and subject to an AMR. This system is exclusive to Catawba and is further described in Section 6.2.4 of the Catawba UFSAR.

2.3.2.5.1 Technical Information in the Application

Catawba's containment valve injection water system is an ESF with the intended function of injecting water at a pressure exceeding containment design peak pressure between the two seating surfaces of double-disc gate valves used for containment isolation. The containment valve injection water system thus helps reduce potential offsite dose consequences to less than the values specified in 10 CFR Part 100. The containment valve injection water system has two trains, each consisting of piping headers and a nitrogen-pressurized surge tank.

Based on the intended function identified above, for Catawba only, the applicant identified the following four component types of the containment valve injection water system as within the scope of license renewal and subject to an AMR-piping, tanks, tubing, and valve bodies. The applicant further identified the intended functions of these component types to be maintaining the integrity of the containment valve injection water system pressure boundary.

2.3.2.5.2 Staff Evaluation

The staff reviewed Section 2.3.2.5 of the LRA, and the associated piping and instrumentation diagrams, to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the containment valve injection water system that are within the scope of license renewal in accordance with 10 CFR 54.4. The staff then reviewed the AMR results provided in Table 3.2-5 of the LRA to determine whether the applicant appropriately identified the components belonging to the containment valve injection water system that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). To perform a conservative review, the staff focused on those components of the containment valve injection water system that were not identified as meeting the above requirements. The staff also reviewed Section 6.2.4 of the Catawba UFSAR and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted from Section 2.3.2.5 of the applicant's LRA.

The applicant considered all essential portions of the containment valve injection water system as within the scope of license renewal. However, the staff noted that two segments of piping did

not appear to be highlighted correctly on one of the containment valve injection water system piping and instrumentation diagrams. As detailed in a telecommunication summary dated November 14, 2001, the applicant confirmed that these two segments of piping were considered to be within the scope of license renewal and should have been highlighted. The staff finds the applicant's response satisfactory because it is consistent with 10 CFR 54.4, and notes that the additional information provided by the applicant is consistent with the general information and descriptions of the containment valve injection water system provided in the LRA.

2.3.2.5.3 Conclusions

The staff concludes that there is reasonable assurance that the applicant has appropriately identified the components of Catawba's containment valve injection water system that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

*2.3.2.6 Refueling Water System*

In LRA Section 2.3.2.6, "Refueling Water System," the applicant described the components of the refueling water system that are within the scope of license renewal and subject to an AMR. Section 9 of the Catawba and McGuire UFSARs provides additional information concerning their respective refueling water systems.

2.3.2.6.1 Technical Information in the Application

The Catawba refueling water system provides an adequate supply of borated water to the emergency core cooling system (ECCS) and containment spray system in order to mitigate the consequences of a design basis event. The refueling water system, safety injection system, residual heat removal system, and chemical and volume control system (CVCS) together form the ECCS.

The McGuire refueling water system provides a source of borated water to be used during refueling for the ECCS to mitigate the consequences of a UFSAR Chapter 15 accident or as borated makeup water for the spent fuel pool (SFP). The system can remove impurities from the refueling cavity and transfer canal during refueling, and it can clean up the refueling water storage tank (RWST) water following refueling. This can be accomplished by routing flow through the purification loop of the spent fuel pool cooling system. The refueling water system provides a means of transferring the final 30 percent of the refueling water between the refueling cavity and the refueling water storage tank. It also provides a secondary means of filling the refueling cavity from the refueling water storage tank.

Using the methodology described in LRA Section 2.1.2, "Screening Methodology," the applicant compiled a list of mechanical component commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The mechanical components subject to AMR, their intended functions, and materials of construction for the refueling water system are listed in Table 3.2-6 of the LRA. In LRA Table 3.2-6, the applicant lists the following four component commodity groups as subject to an AMR-pipe, refueling water storage tank, tubing, and valve bodies. LRA Table 3.2-6 also lists expansion joints as a component type that is subject to an AMR only for the McGuire refueling water system. The

applicant states that maintaining pressure boundary integrity is the intended function of the SCs subject to an AMR.

2.3.2.6.2 Staff Evaluation

The staff reviewed Section 2.3.2.6 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the refueling water system SCs that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.2.6 of the LRA and Section 9 of the Catawba and McGuire UFSARs to determine if the applicant adequately identified the SSCs of the refueling water system that are in the scope of license renewal. The staff verified that those portions of the refueling water 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 Section 2.3.2.6 of the LRA. The staff then focused its review on those portions of the refueling water system that were not identified as within the scope of license renewal to verify that they do not meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional system functions that were not identified in the LRA, and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4.

The staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those portions of the refueling water system that are identified as within the scope of license renewal. The applicant identifies and lists the SCs subject to AMR for the refueling water systems in Table 3.2-6 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff performed its review by sampling the SCs that the applicant determined were within the scope of license renewal but not subject to AMR to verify that these SCs performed their intended functions with moving parts or with a change in configuration or properties, or were subject to replacement based on qualified life or specified time period.

The applicant identified the portions of the refueling water system that are within the scope of license renewal in the drawings referenced in the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that are within the scope of license renewal. The applicant highlighted those components which it believed perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and the descriptions in the UFSAR to ensure they were representative of the refueling water system. The staff sampled portions of the flow diagram that were not highlighted to verify that these components did not meet any of the scoping criteria in 10 CFR 54.4.

During its review, the staff identified several potential discrepancies in the drawings used by the applicant to show which refueling water system components for both Catawba and McGuire are within the scope of license renewal. The discrepancies were that components that should have been shown as within the scope of license renewal were not appropriately marked. By letter dated January 23, 2002, the staff requested, in RAIs 2.3.2.6-2 and 2.3.2.6-3, clarification from the applicant. In its responses dated April 15, 2002, the applicant stated that the components in

question were within the scope of license renewal and the drawings had been improperly marked. Based on the above, the staff finds the applicant's responses acceptable.

One of the McGuire refueling water system drawings for Unit 2, MCFD-2571-01.00, shows that the refueling cavity is within the scope of license renewal. The equivalent drawings for McGuire 1 and both Catawba units indicate that the refueling cavity is not with the scope of license renewal. In addition, the refueling cavity is not listed in Table 3.2-6, "Aging Management Review Results - Refueling Water System." The UFSARs for both Catawba and McGuire credit the refueling cavity walls as protecting vital equipment and components from the dynamic effects of a postulated pipe break. Accordingly, the staff believed the refueling cavity should be within the scope of license renewal. By letter dated January 23, 2002, the staff requested, in RAI 2.3.2.6-1, the applicant to explain why this component was not highlighted as within scope. In its response dated April 15, 2002, the applicant stated that the refueling cavity is a structural component, and it is within the scope of license renewal. According to the applicant, structural components are not normally shown on flow diagrams, but where they are, the structural components are not addressed by the highlighting conventions. The applicant also stated that AMR results for the refueling cavity are located in Table 3.5-1 of the LRA. Based on the above, the staff finds the applicant's response acceptable.

During its review, the staff identified a potential discrepancy in the drawings used by the applicant to show the minimum-flow piping for the safety injection pumps. The drawings showed that the non-safety-related portion of minimum-flow piping from the isolation valve to the RWST was not within the scope of license renewal. The staff was concerned that the failure of that piping could prevent the minimum-flow piping from performing its function and result in damage to the safety injection pump. By letter dated January 23, 2002, the staff requested, in RAI 2.3.2.6-5, the applicant to explain why this piping was not indicated as within scope. In its response dated April 15, 2002, the applicant stated that the non-safety-related portions of the minimum-flow piping were not within the scope of license renewal because they did not support any safety injection system intended function. The applicant also stated that a loss of pressure boundary of the non-safety-related portion of the minimum-flow piping did not adversely affect the ability of the safety injection pump to achieve minimum recirculation flow. Because failure of the non-safety-related portions of the minimum flow piping would not prevent the safety-related portion of the safety injection pump from performing its intended function, the staff concludes that the minimum flow piping is outside the scope of license renewal.

2.3.2.6.3 Conclusions

On the basis of its review of the information contained in Section 2.3.2.6 of the LRA, the supporting information in the Catawba and McGuire UFSARs, as described above, and the response to the staff's RAI, dated April 15, 2002, no omissions by the applicant were identified. The staff concludes that there is reasonable assurance that the applicant adequately identified those portions of the refueling water system that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.2.7 Residual Heat Removal System*

2.3.2.7.1 Technical Information in the Application

McGuire Nuclear Station

As described in the LRA, the RHR system transfers heat from the reactor coolant system to the component cooling system to reduce the temperature of the reactor coolant to the cold-shutdown temperature at a controlled rate during the second part of unit cooldown, and maintains this temperature until the unit is started up. The RHR system also serves as part of the emergency core cooling system during the injection and recirculation phases of small-break and large-break loss-of-coolant accidents.

Catawba Nuclear Station

The RHR system transfers heat from the reactor coolant system to the component cooling system to reduce the temperature of the reactor coolant to the cold-shutdown temperature at a controlled rate during the second phase of unit cooldown, and maintains this temperature until the unit is started up. The RHR system also serves as part of the emergency core cooling system during the injection and recirculation phases of design basis events. The RHR system has several secondary functions, which include transferring refueling water between the refueling water storage tank and the refueling cavity before and after refueling operations, providing overpressure protection to the reactor coolant system, providing reactor coolant letdown flow for pressure control and purification during shutdown and refueling, and providing residual heat removal auxiliary pressurizer spray.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for the McGuire and Catawba RHR systems are listed in Table 3.2-7 of the LRA. The component types that were identified in the table include heat exchanger (tubes, tube sheet, channel head, and shell), RHR pump seal water (tubes and shell), heat exchanger RHR pump seal water (cover) (Catawba only), orifices, pipe, pump casings, tubing, and valve bodies. The applicant further noted in the table that the intended functions of these components are maintaining the integrity of the residual heat removal system pressure boundary, transferring heat, and throttling flow.

2.3.2.7.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the RHR components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 portions of the McGuire and Catawba UFSARs relevant to the RHR system and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted by the applicant.

The Catawba UFSAR (page 5.4-48) states that "a minimum number of charging auxiliary spray has been included in the piping analysis for inadvertent operation and for emergencies." Also the McGuire UFSAR (page 9.3-25) states that "after the Residual Heat Removal System is placed in service and the reactor coolant pumps are shut down, further cooling of the pressurizer liquid is accomplished by charging through the auxiliary spray line." If these statements imply that auxiliary spray is relied upon to mitigate design-basis events, or is relied on in safety analyses or plant evaluations to perform a function that is required by the regulations governing fire protection and station blackout, then the staff believes that the applicant should explain why the spray head (the component which actually sprays the water inside the pressurizer) does not require aging management to detect cracking and/or clogging of the spray holes, or any other age-related degradation over the extended period of operation. The staff requested, in RAI 2.3.2.7-1, that the applicant determine whether the intended function of the pressurizer spray head to depressurize the reactor coolant system is within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) or (3). The staff requested confirmation that the spray head is not credited for immediate pressure reduction during design basis events, postulated fire events, or station blackout. In its response dated April 15, 2002, the applicant provided the following—

> Auxiliary spray is not relied upon to mitigate design basis events or to demonstrate compliance with requirements associated with Station Blackout. However, Auxiliary spray is used during the transition between Hot Shutdown (Mode 4) and Cold Shutdown (Mode 5) in order to achieve cold shutdown following a postulated fire in the plant pursuant to the requirements of §50.48. The pressurizer spray head is a full cone center jet nozzle with a flow opening that is approximately three inches in diameter at both McGuire and Catawba Nuclear Stations. The spray nozzle does not resemble a shower head, therefore clogging of spray holes is not a potential aging effect. Cracking of the spray head due to either (1) stress corrosion cracking or (2) reduction in fracture toughness (due to thermal embrittlement) of the cast austenitic stainless steel (CASS) is a potential aging effect. Stress corrosion cracking is managed by the Chemistry Control Program. The Chemistry Control Program is described in Appendix B.3.6 of the Application. Uncertainty exists as to whether reduction in fracture toughness could manifest itself to the point where cracking could occur. Gross cracking and structural damage would be required for the spray head to function improperly. Because of this uncertainty, Duke commits to perform a one time inspection of the pressurizer spray head on one unit as described below to assess the condition of the spray head regarding cracking. The details of the Pressurizer Spray Head Examination follow.
>
> Table 3.[1*]-1 of the Application is supplemented with the following information—

| Component Type | Component Function | Material | Environment | Aging Effect | Aging Management Programs and Activities |
|---|---|---|---|---|---|
| [Pressurizer*] | | | | | |
| Pressurizer Spray Head | Spray | Cast Stainless Steel | Borated Water | Cracking | Chemistry Control Program<br><br>Pressurizer Spray Head Examination |

[* corrections were made by the staff to reflect the correct table and component]

Pressurizer Spray Head Examination

Note: The Pressurizer Spray Head Examination is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station, except as otherwise noted.

The purpose of the Pressurizer Spray Head Examination is to characterize any cracking of the spray head due to reduction in fracture toughness (due to thermal embrittlement) of the cast austenitic stainless steel (CASS) in the environment of the pressurizer steam space. Uncertainty exists as to whether exposure of the CASS spray head in this environment could result in cracking such that the spray head spray function could become degraded or completely lost during the period of extended operation. This examination will visually inspect one spray head for cracking. The Pressurizer Spray Head Examination is a one-time-inspection.

Duke plans to inspect the operating unit with the most hours at operating temperature among the four units at McGuire and Catawba. McGuire Unit 1 is expected to be the lead unit for this inspection since it is expected to have the most hours of operation among the four units at McGuire and Catawba. After the results of the McGuire Unit 1 inspection are evaluated, additional examinations may be performed on the spray heads at McGuire Unit 2 and Catawba Units 1 and 2.

[Scope] The scope of the Pressurizer Spray Head Examination is the internal spray heads of the McGuire and Catawba pressurizers.

[Preventive Actions] No actions are taken as part of this program to prevent aging effects or mitigate aging degradation.

[Parameters Monitored of Inspected] The parameter inspected by the Pressurizer Spray Head Examination is cracking of the pressurizer spray head due to reduction in fracture toughness (thermal embrittlement).

[Detection of Aging Effects] The Pressurizer Spray Head Examination is a one-time inspection and will detect the presence of cracking of the pressurizer spray heads.

[Monitoring & Trending] The Pressurizer Spray Head Examination is a visual examination (VT-3) of the pressurizer spray head. No actions are taken as part of this program to trend inspection or test results.

For McGuire, this new inspection will be completed following issuance of renewed operating licenses for McGuire Nuclear Station and by June 12, 2021 for McGuire Unit 1. Any required inspection of the Unit 2 pressurizer spray head will be completed following issuance of renewed operating licenses for McGuire Nuclear Station and by March 3, 2023 for McGuire Unit 2.

For Catawba, if necessary following the results of the McGuire Unit 1 examination, this new inspection will be completed following issuance of renewed operating licenses for Catawba Nuclear Station by December 6, 2024 for Catawba Unit 1 and by February 24, 2026 for Catawba Unit 2.

[Acceptance Criteria] The acceptance criterion for Pressurizer Spray Head Examination will be in accordance with ASME Section XI, VT-3 examinations.

[Corrective Action & Conformation Process] If the results of the inspection do not meet the specified acceptance criterion, then corrective actions will be taken such as replacing the affected spray heads. If cracks are detected in the initial spray head visual examination, then visual examinations will be conducted on the spray heads for McGuire Unit 2 and Catawba Units 1 and 2. Specific corrective actions and confirmation are implemented in accordance with the corrective action program.

[Administrative Controls] The Pressurizer Spray Head Examination will be implemented by plant procedures and the work management system.

[Operating Experience] The Pressurizer Spray Head Examination is a new inspection for which there is not operating experience. However, a similar inspection was reviewed and deemed acceptable by the NRC staff for Oconee, as stated in the conclusions below.

Conclusion - The Pressurizer Spray Head Examination is similar to the corresponding Pressurizer Examination described and evaluated in NUREG-1723. Based on the above review, the implementation of the Pressurizer Spray Head Examination will ensure the pressurizer spray head will continue to perform its intended function for the period of extended operation.

The McGuire and Catawba UFSAR Supplements will be revised to include the above mentioned summary description of the Pressurizer Spray Head Examination.

The staff agrees with the applicant's conclusion that the pressurizer spray head is within the scope of license renewal and is subject to an AMR. The staff's evaluation of the proposed aging management programs and activities for the pressurizer spray head, as presented above, is documented in Section 3.1.2.2 of this SER.

2.3.2.7.3 Conclusions

On the basis of its review of the information presented in Section 2.3.2.7 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to the requests for additional information, the staff determined that the applicant did not include the pressurizer spray head of the auxiliary spray system as within the scope of license renewal and subject to an AMR for McGuire and Catawba. However, the applicant subsequently added the pressurizer spray head to the scope of components subject to an AMR. No additional omissions were identified. Therefore, the staff concludes that there is reasonable assurance that the applicant adequately identified those portions of the RHR and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR Part 54.4(a) and 10 CFR Part 54.21(a)(1).

*2.3.2.8 Safety Injection System*

2.3.2.8.1 Technical Information in the Application

The SIS constitutes a major portion of the emergency core cooling system. Along with the RHR, chemical and volume control, and refueling water systems, the SIS provides emergency cooling to the reactor core in the event of a break in either the primary (reactor coolant) or secondary (steam) systems. The three primary functions of the emergency core cooling system are (1) removing stored (sensible) and fission product decay heat, (2) controlling reactivity, and (3) precluding reactor vessel boron precipitation. The SIS supports each of these functions.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for the McGuire and Catawba SISs are listed in Table 3.2-8. The component types that were identified in the table include orifices, pipe, cold-leg accumulators, pump casings, tubing, and valve bodies. The applicant further noted in the table that the intended functions of these components are maintaining the integrity of the safety injection system pressure boundary and throttling flow.

2.3.2.8.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the SIS and associated pressure boundary components and supporting structures, 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 portions of the McGuire and Catawba UFSARs relevant to the SIS and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted by the applicant.

The UFSARs for Catawba (page 6.2-46) and McGuire (page 17.1-2), state that screen assemblies and vortex suppressors are used in the containment sump, which provides water for the ECCS recirculation phase, and one of the intended functions is to protect the ECCS pumps from debris and cavitation due to harmful vortex following an LOCA. The staff noted that the sump screens were identified in Table 3.5-1, "AMR Results - Reactor Building" however, the vortex suppressors were not identified in the LRA as within scope and requiring an AMR. By letter dated January 23, 2002, the staff requested, in RAI 2.3.2.8-1, the applicant to explain the reason for the omission. In its response dated April 15, 2002, the applicant explained that the vortex suppressor is a subcomponent of the recirculation intake sump screen assembly, is subject to an AMR, and is addressed in Table 3.5-1 (page 3.5-9, row 3) of the LRA. Each sump screen assembly consists of filtering screen panels which surround the recirculation lines intake and extend to the floor. The screen panels consist of vortex suppressor grates, which prevent local vortex disturbances and large debris from reaching the inner fine screen. The inner fine screen prevents particles that are large enough to impair ECCS or containment spray performance from being drawn into these systems. UFSAR Figures 6-111 (Catawba) and 6-196 (McGuire) provide diagrams of the containment sump assemblies (including vortex suppressors). This above clarification is acceptable, and the staff did not identify any omissions.

2.3.2.8.3 Conclusions

On the basis of its review of the information presented in Section 2.3.2.8 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to the RAI, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the SIS and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

*2.3.2.9 Miscellaneous Instrumentation System*

In its April 15, 2002, response to RAI 2.3.2.3-2, the applicant described the miscellaneous instrumentation system at McGuire and Catawba, and the components therein, which are within the scope of license renewal and subject to an AMR. The applicant had inadvertently omitted this system from the scoping and AMR screening review submitted in the LRA.

2.3.2.9.1 Technical Information in the Application

The mechanical components of the miscellaneous instrumentation system support the following three components or systems (1) the safety-related containment hydrogen analyzers, (2) the containment integrated leakage rate testing system, and (3) the containment radiation monitors. The intended function of the safety-related hydrogen analyzers is to provide the capability for monitoring the hydrogen concentration within the containment at three different locations following a postulated accident. The intended function of the mechanical components supporting the integrated leakage rate testing system and containment radiation monitors is to isolate the non-essential containment penetrations serving these components to prevent the uncontrolled or unmonitored release of radioactivity to the environment.

Based on the intended functions identified above, the applicant identified the following three component types of the miscellaneous instrumentation system as within the scope of license renewal and subject to an AMR-valve bodies, tubing, and piping (McGuire 1 only). The applicant further identified the intended functions of these component types as maintaining the integrity of the miscellaneous instrumentation system pressure boundary.

2.3.2.9.2 Staff Evaluation

The staff reviewed RAI Response 2.3.2.3-2, dated April 15, 2002, to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the miscellaneous instrumentation system that are within the scope of license renewal in accordance with 10 CFR 54.4. The staff then reviewed the LRA table of AMR results included with the applicant's response to RAI 2.3.2.3-2 to determine whether the applicant appropriately identified the components belonging to the miscellaneous instrumentation system that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). In order to perform a conservative review, the staff focused on those components of the miscellaneous instrumentation system that were not identified as meeting the above requirements. The staff also reviewed the McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted by the applicant.

The applicant considered the safety-related hydrogen analyzers and their supporting mechanical components to be within the scope of license renewal. The hydrogen analyzers employ an electrochemical process and, as their functioning involves a change of state, are not subject to an AMR. However, the applicant identified that the tubing and valve bodies which connect the containment atmosphere to the hydrogen analyzers are passive, long-lived components subject to an AMR. For the containment integrated leakage rate testing system and the containment radiation monitors, the applicant considered only the safety-related valve bodies, tubing, and piping used for containment isolation to be within the scope of license renewal and subject to an AMR. As the integrated leakage rate testing system and containment radiation monitors are not otherwise relied upon to satisfy assumptions made in the safety analyses for McGuire or Catawba, the staff finds the applicant's approach acceptable.

2.3.2.9.3 Conclusions

The staff has concluded that, for both McGuire and Catawba, there is reasonable assurance that the applicant has appropriately identified the components of the miscellaneous instrumentation

system that are within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

### 2.3.3 System Scoping and Screening Results: Auxiliary Systems

In Section 2.3.3, "Auxiliary Systems," of the McGuire and Catawba LRA, the applicant described the SSCs of the auxiliary systems that are subject to an AMR for license renewal.

*2.3.3.1 Auxiliary Building Ventilation System*

In LRA Section 2.3.3.1, "Auxiliary Building Ventilation System," the applicant identified portions of the auxiliary building ventilation (VA) system and the components that are within the scope of license renewal and subject to an AMR. In this section of the LRA, the applicant stated that the VA system is further described in McGuire UFSAR Section 9.4.2 and Catawba UFSAR Section 9.4.3.

The applicant evaluated component supports for VA system ductwork within Table 3.5-3 of the LRA. The applicant evaluated electrical components that support the operation of the systems in Section 2.1.2 of the LRA. The staff's scoping evaluation of structures and component supports is provided in Section 2.4 of this SER. The staff's evaluation of electrical components and instrumentation and controls in the VA system is documented in Section 2.5 of this SER.

2.3.3.1.1 Technical Information in the Application

The VA system automatically aligns to maintain the ECCS pump rooms at a negative pressure, with respect to the adjacent areas, so that effluent from these rooms is filtered prior to being released to unit vents following a design basis accident. The ECCS pump rooms include the safety injection pumps, residual heat removal pumps, centrifugal charging pumps, and containment spray pumps.

The VA system serves all areas of the auxiliary building with the exception of the control room and fuel handling areas. Ventilation air is supplied to both clean and potentially contaminated areas of the auxiliary building. Control of airborne activity is accomplished by exhausting air supplied to clean areas through the potentially contaminated areas. This air in turn is processed by the filtered exhaust subsystem. This provides a positive flow of air from clean areas to areas of potential contamination. The remaining air supplied to clean areas is exhausted by the unfiltered exhaust subsystem. All air exhausted from the auxiliary building, both filtered and unfiltered, is directed to the unit vent. Exhaust air is monitored for radiation prior to an atmosphere release.

During normal operation, the VA system supply and exhaust fans are automatically stopped upon indication of high radiation level in the unit vent. Upon receipt of an ESF actuation signal, all VA system components automatically stop. The filtered exhaust subsystems have two separate and redundant trains. The filtered exhaust subsystem automatically cycles on with emergency Class 1E standby power. With the exception of the ECCS pump rooms, all areas of the auxiliary building are automatically isolated from the filtered exhaust system.

In Section 2.3.3.1 of the LRA, and Sections 9.4.2 and 9.4.3 of the McGuire and Catawba UFSARs, respectively, the applicant identified the following intended functions of the McGuire and Catawba VA systems based on 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2)—

McGuire

Section 2.3.3.1 of the LRA—

- to automatically align to maintain the ECCS pump rooms at a negative pressure so that air exhausted from these rooms is filtered prior to being released following a DBA

Section 9.4.2 of the UFSAR—

- to maintain a suitable environment for the operation of equipment and personnel access as required for inspection, testing, and maintenance
- to hold the auxiliary building at a slightly negative pressure to minimize outleakage
- to purge the auxiliary building to the unit vent. The air that is exhausted to the environment from potentially contaminated areas is monitored and filtered so that the limits of 10 CFR Part 20 and the technical specifications are not exceeded
- provide a suitable environment for the operation of vital equipment during an accident

Catawba

Section 2.3.3.1 of the LRA—

- to automatically align and maintain the ECCS pump rooms at a negative pressure so that air exhausted from these rooms are filtered prior to release following a design basis accident

Section 9.4.3 of the UFSAR—

- to maintain a suitable environment for the operation, maintenance, and testing of equipment
- to maintain a suitable environment for personnel access
- to minimize the release of radioisotopes from the ECCS pump rooms during accident conditions

On the basis of the intended functions identified above for the VA systems, the portions of these systems that were identified by the applicant as within scope include all VA system safety-related components (electrical, mechanical, and instruments). The applicant described its methodology for identifying the mechanical components subject to an AMR in Section 2.1.2.1.2 of the LRA. On the basis of this methodology, the applicant identified the portions of the VA system that are within the scope of license renewal on the flow diagrams listed in Section 2.3.3.1 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical components and component types subject to an AMR that are within the evaluation boundaries highlighted on the flow diagrams and identified their intended functions. The applicant provided this list in Table 3.3-1 of the LRA.

The following component types are identified in Table 3.3-1 of the LRA as within the scope of license renewal and subject to an AMR-airflow monitors, ductwork, filters, tubing, valve bodies, air handling units (Catawba only), air handling units - tubes and plenum assembly (McGuire

only), and heaters (Catawba only). In Table 3.3-1 of the LRA the applicant noted that the VA system pressure boundary and heat exchanger functions are the only applicable intended functions of VA system components subject to an AMR.

2.3.3.1.2 Staff Evaluation

To verify that the applicant identified the components of the VA system 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 reviewed the flow diagrams listed in Section 2.3.3.1 of the LRA showing the evaluation boundaries for the highlighted portion of the VA system within the scope of license renewal, and Table 3.3-1 of the LRA, which lists the mechanical components and applicable intended functions subject to an AMR. The staff also reviewed Sections 9.4.2 and 9.4.3 of the McGuire and Catawba UFSARs, respectively, to determine if there were any portions of the VA system that met the scoping criteria in 10 CFR 54.4(a) but were not identified as being within the scope. The staff reviewed the UFSAR also to determine if there were any safety-related system functions that were not identified as intended functions in the LRA, and if there were any structures or components that have an intended function that might have been omitted from the scope of structures or components that require an AMR. The staff compared the functions described in the UFSAR to those identified in the LRA.

The applicant identified the structures and components subject to an AMR for the VA system using the screening methodology described in Section 2.1 of the LRA and listed them in Table 3.3-1 of the LRA. The staff evaluated the scoping and screening methodology in Section 2.1 of this SER. The staff sampled structures and components from Table 3.3-1 of the LRA to verify that the applicant identified the structures and components subject to an AMR. The staff also sampled the structures and components that are within the scope of license renewal but not subject to an AMR. Based on the sample, the staff verified that these structures and components perform their intended functions without moving parts or without a change in configuration or properties, and are not subject to replacement on the basis of a qualified life or specified time period.

To ensure that those portions of the VA system excluded from scope do not perform any intended functions, the staff determined that additional information was needed to clarify information in the UFSAR and LRA. The staff noted that LRA Section 2.3.3.1 presents a summary description of the system functions and a listing of flow diagrams. The flow diagrams highlight the evaluation boundaries, and Table 3.3-1 of the LRA tabulates the components within the scope of license renewal and are subject to an AMR for the VA system. However, the corresponding drawings and information in the UFSAR indicate that additional components were not listed in Table 3.3-1 of the LRA.

The staff noted that the applicant did not identify housings for active components that require an AMR. The determination should consider whether failure of the housing would result in a failure of the associated active component to perform its intended function and whether the housing meets the long-lived and passive criteria as defined in the rule.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-1, specific information concerning the exclusion of fan housings from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that cooling fans are not included in the AMR results tables in the LRA. The applicant goes on to state that those cooling fans, without

subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and determined that the applicant's basis for excluding fan housings is not consistent with the license renewal rule because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within the scope of license renewal. Furthermore, because the fan housings are passive and long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-1.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-2, specific information concerning the exclusion of damper housings from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that dampers are not included in the AMR result tables in the LRA. The applicant added that ventilation dampers, without sub-component exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and has determined that the applicant's basis for excluding damper housings is not consistent with the license renewal rule because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within scope of license renewal. Furthermore, because the damper housings are passive and long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-2.

In its response to open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the auxiliary building ventilation system fan and damper housings that are in scope at McGuire and Catawba. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open items 2.3-1 and 2.3-2. The applicant indicated that the aging effects will be adequately managed such that the intended functions of the fans and dampers will be maintained consistent with the current licensing basis for the period of extended operation. The staff's evaluation of the AMR results is documented in Section 3.3.1.2 of this SER. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-3, specific information concerning the exclusion of housings for radiation monitors, smoke detectors, and air flow monitors from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that, based on guidance provided in NEI 95-10, Revision 3, radiation monitors, smoke detectors, and chlorine detectors are not considered passive components and are therefore not subject to an AMR. Because these monitors and detectors do not perform an intended function as defined in 10 CFR 54.4, the staff finds the applicant's response acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-4, specific information concerning the exclusion of building sealants from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that it does not classify materials such as sealants to be structures or components. The applicant stated the pressure boundary function is addressed by TS surveillance testing. However, the applicant did not indicate that any of the TS surveillance requirements listed in its response were credited for aging management (and identified as AMPs). Nor did the applicant furnish a description of, or information pertaining to, a TS surveillance AMP (including discussion of the 10 elements of the AMP) for the staff's review.

On page 2.1-24 of the LRA, the applicant stated that "seals associated with maintaining pressure boundary are limited to the divider barrier seals in the reactor building." Since the applicant does not discuss the treatment of structural sealants other than the divider barrier seal, it is not clear to the staff that building (structural) sealants were considered during an AMR of the structure (building) for which they are a subcomponent. Furthermore, according to page 3.5-10 of the LRA, the Inspection Program for Civil Engineering Structures and Components is credited by the applicant to monitor the aging of building concrete structural components (reinforced concrete beams, columns, floor slabs, and walls). According to Section B.3.21, of Appendix B of the LRA, the scope of the Inspection Program for Civil Engineering Structures and Components does not include structural sealants. Table 2.1-3, on page 2.1-15 of the SRP-LR, states that an applicant's structural AMP is expected to address structural sealants "with respect to an AMR program." The intent of this statement is that an applicant's structural AMP is expected to manage or monitor the aging effects of the structure and associated sub-components that are identified during the AMR. The basis for this SRP guidance is documented in the summary (issued January 21, 2000) of a December 8, 1999, meeting to discuss the staff's position on the treatment of consumables. This summary clearly states, on page 3, that structural sealants would be implicitly included at the component level and considered during the AMR. Since the structural AMP identified for the concrete structural components does not address structural sealants, and since that applicant did not identify the TS surveillances listed in its response as AMPs or provide appropriate information to support the staff's review of these surveillances as AMPs, the staff characterized this issue as SER open item 2.3-3.

In its response to this open item, dated October 28, 2002, the applicant credited a visual inspection of the structural sealant used to maintain ventilation pressure boundary integrity of the control room area, emergency core cooling pump rooms, annulus, and fuel handling building. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open item 2.3-3. The staff's evaluation of the Ventilation Area Pressure Boundary Sealants Inspection Program is provided in Section 3.0.3.19 of this SER.

By letter dated January 23, 2002, the staff requested, in RAIs 2.3-5 and 2.3-7(4), specific information concerning the exclusion of passive components associated with ductwork from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant identified these passive components as subcomponents of ductwork. The applicant also stated that ventilation grilles were installed only for aesthetic purposes and perform no intended license renewal function. Because the components serve only an aesthetic purpose and perform no intended function, the staff concludes they are outside the scope of license renewal.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-7(1), specific information concerning the exclusion of passive components associated with moisture eliminators from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant clarified the highlighting and identified moisture eliminators as subcomponents subject to an AMR. On the basis of the information provided, the staff finds the applicant's response acceptable.

Some components that are common to many systems, including the VA system, have been evaluated separately by the applicant in Section 2.1.2.1.2 of the LRA as "replace on condition" commodities. The staff's evaluation of applicant's treatment of these consumables is documented in Section 2.1.3.2.1 of this SER.

In Section 2.4.3 of this report, the staff evaluated component supports for piping, cables, and equipment that supported the design and operation of the VA system. In Section 2.5 of the LRA titled, "Scoping and Screening Results: Electrical and Instrumentation and Controls," the staff evaluated electrical and instrument components that support the operation of the VA system.

The staff reviewed the LRA, supporting information in the UFSARs, and the applicant's responses to RAIs. In addition, the NRC staff sampled several components from the VA system flow diagram, as identified in LRA Section 2.3.3.1 to determine whether the applicant properly identified the components within scope and subject to an AMR. No omissions were identified, except as identified in the RAIs.

2.3.3.1.3 Conclusions

On the basis of its review, and with the resolution of open items identified in this SER section, the staff has reasonable assurance that the applicant has adequately identified the VA system structures and components 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, respectively.

*2.3.3.2 Boron Recycle System*

2.3.3.2.1 Technical Information in the Application

McGuire Nuclear Station-As described in the LRA, the boron recycle system receives borated effluent from the reactor coolant system and associated support systems. This borated effluent is demineralized, filtered, and separated into 4 weight percent boric acid and reactor makeup water for reuse. The boron recycle system also provides reactor grade flush water for components in the auxiliary and reactor buildings.

Catawba Nuclear Station-The boron recycle system receives and recycles reactor coolant effluent for reuse of the boric acid and makeup water. The system decontaminates the effluent by means of demineralization and gas stripping, and uses evaporation to separate and recover the boric acid and makeup water. Portions of the boron recycle system are shared between both reactor units, while other portions are unit specific.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for the McGuire and Catawba boron recycle system are listed in Table 3.3-2 of the LRA. The component types that were identified in the table include eductors (McGuire only), filters, flow meters, orifices (Catawba only), pipe, recycle evaporative feed demineralizers, recycle holdup tanks, strainers (Catawba only), tubing, and valve bodies. The applicant further noted in the table that the only intended function of these components is maintaining the integrity of the boron recycle system pressure boundary, transferring heat and throttling flow.

2.3.3.2.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the boron recycle system components and supporting structures within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba on the boron recycle system and associated pressure boundary 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 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 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 an applicable intended function(s), the staff sought to 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 McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted by the applicant.

The staff did not identify any omissions.

2.3.3.2.3 Conclusions

On the basis of its review of the information presented in LRA Section 2.3.3.2 and the supporting information in the McGuire and Catawba UFSARs, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the boron recycle system and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

*2.3.3.3 Building Heating Water System*

In LRA Section 2.3.3.3, "Building Heating Water System," the applicant described the components of the McGuire heating water system and the Catawba building heating water system that are within the scope of license renewal and subject to an AMR. For simplification, the systems will be referred to as the building heating water system for both McGuire and Catawba when addressing common review attributes. The staff reviewed the LRA for McGuire and Catawba to determine if the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

2.3.3.3.1 Technical Information in the Application

The McGuire Nuclear Station heating water system satisfies normal heating requirements of the auxiliary building ventilation system, fuel pool ventilation system, containment and incore instrumentation room purge system, service building ventilation system, and the turbine building heating system. The Catawba Nuclear Station building heating water system supplies hot water to the heating coils of various HVAC units throughout the plant.

The applicant described the process for identifying the SSCs within the scope of license renewal in LRA Section 2.1.1, "Scoping Methodology," and its process for identifying the SSCs subject to an AMR in LRA Section 2.1.2, "Screening Methodology." Using the methodology described in LRA Section 2.1.1, the applicant listed the systems and structures that are within the scope of

license renewal in LRA Tables 2.2-1 and 2.2-2 for McGuire and Catawba, respectively. The McGuire heating water system is listed on page 2.2-3 of LRA Table 2.2-1. The Catawba building heating water system is listed on page 2.2-7 of LRA Table 2.2-2.

The LRA notes that the only portions of the building heating water system subject to an AMR are the Duke Class F portions of the building heating water system that are in scope at Catawba and McGuire. Using the methodology described in Section 2.1.2 of the LRA, the applicant listed the McGuire and Catawba mechanical components that are subject to an AMR in Table 3.3-3, "Aging Management Results - Building Heating Water System." This table also lists the intended function of each component and the materials of construction. The applicant identified the following components from the building heating water system that are subject to an AMR—pipes and valve bodies. The applicant identified maintaining pressure boundary integrity as the only intended function of the SCs subject to an AMR.

2.3.3.3.2 Staff Evaluation

The staff reviewed Section 2.3.3.3 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the building heating water system that are within the scope of license renewal in accordance with 10 CFR 54.4 and to verify that the applicant appropriately identified the SCs that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the information presented in Section 2.3.3.3 of the LRA and the applicable piping and instrument drawings referenced therein to determine if the applicant adequately identified the portions of the building heating water system that are within the scope of license renewal. The building heating water system is a non-safety-related system whose postulated failure could prevent satisfactory accomplishment of certain safety-related functions. To preclude these postulated failures, portions of this system are seismically designed (i.e., Duke Class F). The applicant included all components within the seismically designed piping boundaries of this system within the scope of license renewal per 10 CFR 54.4(a)(2). The staff verified that those portions of the building heating water system that meet the scoping requirements of 10 CFR 54.4 were included within the scope of license renewal and were identified by the applicant in LRA Section 2.3.3.3. To verify that the applicant did include the applicable portions of the building heating water system within the scope of license renewal, the staff focused its review on those portions of the building heating water system that were not identified as within the scope of license renewal to verify that they did not meet the scoping criteria of 10 CFR 54.4.

During its review of Catawba drawings CN-1606-1, CN-1606-1.6, CN-1606-1.7, CN-1606-1.8, and CN-1606-1.9, the staff observed that the boundaries end in segments of pipe that are non-isolable and did not appear to coincide with structural boundaries (e.g., building walls). By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.3-1, why the termination of Class F piping depicted on the license renewal drawings was at locations other than building walls or valves for the Catawba building heating water system. In its response dated April 15, 2002, the applicant noted that for the building heating system, it was determined that only loss of pressure boundary in the large-diameter piping in the auxiliary building is a concern for flooding. Therefore, the small-diameter piping and the piping in the turbine building is not designated as Class F. The piping class breaks occur at the branch line tees and at the auxiliary building/turbine building wall. The applicant stated that the piping class breaks on the flow

diagram are misleading. On drawing CN-1606-1.0, the class break is shown at a flange inside the auxiliary building. Applicant review of layout drawings indicated that the class break occurs on the turbine building side of the auxiliary building/turbine building wall. Of the other locations questioned by the staff on the remaining flow diagrams, the applicant review of layout drawings indicated that the class break occurs at the branch line tees, although the flow diagrams indicate the class break is some distance down the small-diameter piping. The applicant entered a corrective action report into the corrective action program to clarify the flow diagrams. The applicant confirmed that the piping and valves associated with the Class F portions of these lines are contained in LRA Table 3.3-3. Notwithstanding the clarification of the boundaries on the Catawba LRA drawings discussed above, the staff did not identify any omissions in the applicant's scoping review.

The staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those portions of the building heating water system that are identified as within the scope of license renewal. The applicant listed the SCs subject to an AMR for the building heating water system in Table 3.3-3 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER.

The applicant identified the portions of the building heating water system that are within the scope of license renewal by drawings referenced in LRA Section 2.3.3.3. In addition, the applicant lists the pipe and valve body mechanical component commodity groups that are subject to an AMR and their intended function(s) in Table 3.3-3 of the LRA.

The license renewal drawings were highlighted by the applicant to identify those portions of the building heating water system meet at least one of the scoping criteria of 10 CFR 54.4. The staff performed its review by sampling the SCs that the applicant determined to be within the scope of license renewal, but not subject to an AMR, to verify that no structure or component that performs its intended function(s) without moving parts or without a change in configuration or properties, and that is not subject to replacement on the basis of qualified life or specified time period, was excluded from an AMR. The staff did not identify any omissions.

2.3.3.3.3 Conclusions

On the basis of its review of the information contained in Section 2.3.3.3 of the LRA and the LRA drawings, the staff did not identify any omissions in the scoping of the building heating water system by the applicant. The staff concludes that there is reasonable assurance that the applicant has identified those portions of the McGuire heating water system and the Catawba building heating water system that are within the scope of license renewal, and the SCs that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.4 Chemical and Volume Control System*

2.3.3.4.1 Technical Information in the Application

The CVCS is an integral part of the emergency core cooling system and provides high-pressure injection and recirculation of borated water to the reactor coolant system cold legs following small-break and large-break loss-of-coolant accidents, and main steam line breaks. The CVCS is also used to provide negative reactivity to the core by boron injection.

The component types, component functions, materials of construction, environments, aging effects, and aging management programs/activities for the McGuire and Catawba CVCSs are listed in Tables 3.3-4 and 3.3-5 of the LRA, respectively. The component types that were identified in the tables include blenders, pump casings, filters, tanks, meters, demineralizer-resin traps (McGuire only), demineralizers, heat exchangers-channel head, tube sheet, tubes, shell and interconnecting piping, meters - turbine meters (McGuire only), orifices, pipe, accumulators-non-wetted and wetted (McGuire only), stabilizers (McGuire only), spray nozzles (volume control tank), strainer (Catawba only), dampeners-non-wetted and wetted (McGuire), tubing, valve bodies, and dampeners-bellows exterior and interior (Catawba only). The applicant further noted in these table that the intended functions of these components are maintaining the integrity of the CVCS pressure boundary, throttling and filtering flow, and inducing spray flow.

2.3.3.4.2 Staff Evaluation

The staff reviewed this section of the LRA to determine whether there is reasonable assurance that the CVCS, and associated pressure boundary components and supporting structures 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). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the systems, structures, and components 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 UFSARs for McGuire and Catawba for the CVCS and associated pressure boundary 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 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 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 functions, the staff sought to verify that they either perform these functions 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 McGuire and Catawba UFSARs and did not identify any intended system functions meeting the scoping criteria in 10 CFR 54.4 that were omitted by the applicant.

On November 14, 2001, after completing the initial review, the staff and applicant participated in a conference call to clarify information presented in the LRA pertaining to scoping of certain components. During the conference call, the staff noted that CVCS flow diagram CN-1554-1.6 indicates that the piping from isolation valve 1NV145 to the inlet of the letdown heat exchanger is categorized as line-listing 07 (Duke Class B, ASME Class 2). Portions of this line are highlighted to be within the scope of license renewal. The staff requested that the applicant explain why a portion of the line, including isolation valve 1NV145 to the inlet of the letdown heat exchanger, is not within the scope of license renewal. The applicant indicated that the referenced piping was within the scope of license renewal, and noted that the drawing was in error.

The staff also referred the applicant to flow diagrams CN-1554-1.6 and CN-2554-1.6, which indicate that piping from the CVCS letdown line up to and including valve 1NV152 (Catawba 1) and 2NV152 (Catawba 2) are line-listing 19 (Duke Class B, ASME Class 2). The staff requested

that the applicant explain why these portions of the CVCS are not within the scope of license renewal. The applicant indicated that the referenced piping was within the scope of license renewal, and noted that the drawing was in error.

The staff did not identify any omissions.

2.3.3.4.3 Conclusions

On the basis of its review of the information presented in Section 2.3.3.4 of the LRA, the supporting information in the McGuire and Catawba UFSARs, and the applicant's response to the requests for additional information, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the CVCS and its associated (supporting) structures and components that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

*2.3.3.5 Component Cooling System*

In LRA Section 2.3.3.5, "Component Cooling System," the applicant described the components of the component cooling system that are within the scope of license renewal and subject to an AMR. This system is described in Section 9.2.4 of the McGuire UFSAR and Section 9.2.2 of the Catawba FSAR. The staff reviewed the LRA and the UFSAR for McGuire and Catawba to determine if the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

2.3.3.5.1 Technical Information in the Application

For both McGuire and Catawba, the component cooling system is a closed-loop system relied upon to maintain cooling to the essential header components as required for plant conditions, maintain an intermediate pressure boundary between the reactor coolant system and the nuclear service water (NSW) system to prevent potential radioactive release, provide containment isolation, and maintain containment closure for shutdown.

The applicant described the process for identifying the SSCs within the scope of license renewal in LRA Section 2.1.1, "Scoping Methodology," and its process for identifying the SSCs subject to an AMR in LRA Section 2.1.2, "Screening Methodology." Using the methodology described in LRA Section 2.1.1, the applicant listed the systems and structures that are within the scope of license renewal in LRA Tables 2.2-1 and 2.2-2 for McGuire and Catawba, respectively. The McGuire component cooling system is listed on page 2.2-3 of LRA Table 2.2-1. The Catawba component cooling system is listed on page 2.2-7 of LRA Table 2.2-2.

Using the methodology described in Section 2.1.2 of the LRA, the applicant listed the McGuire and Catawba mechanical components that are subject to an AMR in Table 3.3-6, "Aging Management Results - Component Cooling System (McGuire Nuclear Station)," and Table 3.3-7, "Aging Management Results - Component Cooling System (Catawba Nuclear Station)," respectively. These tables also list the intended function of each component and the materials of construction. For both McGuire and Catawba, the applicant identified the following components from the component cooling system that are subject to an AMR—flexible hoses, heat exchanger (tubes, tube sheets, shells, channel heads, and manifold), orifices, pipe, pump

casings, tank, tubing, valves bodies, and annubar tube (Catawba only). The applicant further noted in these tables that the intended functions of these components are maintaining the integrity of the component cooling system pressure boundary, transferring heat, and throttling flow.

2.3.3.5.2 Staff Evaluation

The staff reviewed Section 2.3.3.5 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the component cooling system that are within the scope of license renewal in accordance with 10 CFR 54.4, and to verify that the applicant appropriately identified the SCs that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the information presented in Section 2.3.3.5 of the LRA and the applicable piping and instrument drawings referenced therein, and the McGuire and Catawba FSARs, to determine if the applicant adequately identified the portions of the component cooling system that are within the scope of license renewal. The staff verified that those portions of the component cooling system that meet the scoping requirements of 10 CFR 54.4 were included within the scope of license renewal and were so identified by the applicant in Section 2.3.3.5 of the LRA. To verify that the applicant did include the applicable portions of the component cooling system within the scope of license renewal, the staff focused its review on those portions of the component cooling system that were not identified as within the scope of license renewal to verify that they did not meet the scoping criteria of 10 CFR 54.4.

As a result of this review, the staff identified the need for additional information to complete its review. By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.5-1, why two pipe segments attached to the component cooling water pumps on Catawba 1 drawing CN-1573-1.0 contain license renewal boundary changes immediately adjacent to the pumps without valving for isolation. The staff added that, for Catawba 2 drawing CN-2573-1.0, the corresponding pipe segments also were not highlighted; however, these segments did not have a license renewal flag to indicate the boundary. In its response dated April 15, 2002, the applicant noted that the non-highlighted pipe segments at the component cooling water system pumps are stuffing box overflow lines which do not serve a pressure boundary or other intended function. The applicant noted that the boundary flags on the Unit 1 drawing are correct and a similar set of boundary flags should have been shown on the corresponding Unit 2 drawing CN-2573-1.0. The staff finds the applicant's response acceptable because the lines do not serve an intended function and the licensee clarified why the Unit 2 drawings lacked boundary flags.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.5-2, why the post-accident liquid sample panel II+ cooler was outside the license renewal boundary on drawings CN-1573-1.0 and CN-2573-1.0, since failure of this piping would appear to prevent satisfactory prevention or the mitigation of an accident if accurate results cannot be obtained from the sample panel. In its response dated April 15, 2002, the applicant stated that results from the non-safety-related post-accident liquid sample panel are not relied upon to prevent or mitigate an accident. Therefore, the sample panel, and thus its cooler, does not meet the license renewal scoping criteria. Additionally, license amendments were approved for both McGuire and Catawba after the submittal of the LRA that eliminate the requirements to have and maintain the post-accident sampling systems. Based on this response, the staff agrees with the applicant and concludes

that the post-accident liquid sample panel II+ cooler discussed above is not in scope because it is not relied upon to prevent or mitigate an accident.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.5-3, if a note stating that "Crossover/Overflow line connects near the top of each surge tank" on Catawba 1 drawing CN-1573-1.1 (and a corresponding note for Catawba 2 on drawing CN-2573-1.1) applied separately to what appeared to be a single crossover line and a single overflow line connecting surge tanks 1A and 1B; and if so, with the overflow line outside the license renewal boundary, the staff asked how the crossover line could fulfill its license renewal function if the overflow line is not intact. In its response dated April 15, 2002, the applicant stated that the note only applied to the line shown at J-5 to J-10. The applicant stated that this line is a horizontal connection off the side of each tank near the top of each tank, above the normal water level. The line serves as an overflow such that if one tank is overfilled, the contents will overflow into the other tank. The applicant stated that the note does not apply to the line shown at I-5 to I-10. This line is a vertical connection off the top of each tank and does not effectively connect the two tanks. The loop seals would prevent flow from one tank to the other. This line is not required for the system to perform its function, and because it taps off the top of the tank, its failure would not impact the ability of the system to perform its function. The applicant stated the same situation existed for corresponding note on the Catawba 2 diagram. The staff finds the applicant's response acceptable, since the failure of the line shown at I-5 to I-10, and of the corresponding line on the Catawba 2 diagram, would not affect the ability of the system to perform its function. Therefore, the staff agrees that the pipe segment is outside the scope of license renewal.

The staff noted that Catawba 1 drawing CN-1573-1.2 depicts what appeared to be a (non-highlighted) blank flange at coordinates G-2. By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.5-4, if the component was within the license renewal boundary. In its response dated April 15, 2002, the applicant stated that the blank flange is within the scope of license renewal. While the flange and associated piping is within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off that segment of piping. The blank flange is included with the other piping identified in Table 3.3-7 (page 3.3-78) of the LRA. Based on this clarification, the staff finds the applicant's response acceptable.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.5-5, why the coolers for the reactor vessel supports and associated piping, which are classified as safety-related (Catawba 1 drawing CN-1573-1.3, Catawba 2 drawing CN-2573-1.3, McGuire 1 drawing MCFD-1573-03.01, and McGuire 2 drawing MCFD-2573-03.01), are considered outside the scope of license renewal. In its response dated April 15, 2002, the applicant stated that although the coolers for the reactor vessel supports and associated piping are classified as safety-related, this portion of the system is not within the scope of license renewal because the coolers are no longer used and are isolated by administratively closed valves. The exclusion of this portion of the system from the scope of license renewal represents an exception to the scoping methodology. Since a failure of the isolated piping and components could not prevent the system from performing its intended function, this portion of the system was not included within the scope of license renewal. Based on the explanation provided by the applicant, the staff finds this response acceptable.

The staff noted that Catawba 2 drawing CN-2573-1.3 appeared to have been erroneously drafted, since the highlighting to depict the reactor coolant drain tank heat exchanger as within the scope of license renewal was omitted. By letter dated January 28, 2002, the staff asked, in

RAI 2.3.3.5-6, why the Catawba 2 heat exchanger was not within scope when the corresponding Catawba 1 heat exchanger depicted in drawing CN-1573-1.3 is within scope and listed in Table 3.3-7, "Aging Management Review Results - Component Cooling System (Catawba Nuclear Station." In its response dated April 15, 2002, the applicant confirmed that the Unit 2 reactor coolant drain tank heat exchanger is within the scope of license renewal. While the heat exchanger is within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off the heat exchanger. Based on this confirmation, the staff finds the applicant's response acceptable.

By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.5-11, the applicant to address why the vacuum breaker for the McGuire Unit 1 component cooling surge tank and the associated pipe segment were not highlighted as within the scope of license renewal (drawing MCFD-1573-01.01). The similar vacuum breaker for McGuire 2 was shown to be within scope. In its response dated April 15, 2002, the applicant confirmed that the vacuum breaker is within the scope of license renewal. While the piping and valve are within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off that segment of piping. The piping and valve associated with the vacuum breaker are listed in Table 3.3-6 (pages 3.3-53 and 3.3-55) of the LRA. Based on this confirmation, the staff finds the applicant's response acceptable.

By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.5-12, the applicant to address why McGuire 1 vent valve 1KC0884 and the associated 1-inch line were not depicted in scope of license renewal for the pressure boundary intended function on drawing MCFD-1573-02.00. In its response dated April 15, 2002, the applicant confirmed that vent valve 1KC0884 is within the scope of license renewal. While the piping and valve are within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off that segment of piping. The applicant stated that the piping and vent valve are listed in Table 3.3-6 (pages 3.3-54 and 3.3-56) of the LRA. Based on this information, the staff finds the applicant's response acceptable.

By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.5-13, that the applicant clarify the status of McGuire flow transmitters and associated instrument lines for the reactor coolant pump motor upper bearing coolers on drawings MCFD-1573-03.00 and MCFD-2573-03.00. These are noted as abandoned in place however, most (six of the eight transmitters) remain depicted as connected to the remaining instrumentation lines. The drawing notes that all instrument lines normally open to the process system, through and including the instrument, are included in license renewal scope. However, these lines generally are not flagged. In its response dated April 15, 2002, the applicant noted that, in accordance with plant modification practice, when instrumentation and associated tubing is "abandoned In place," the tubing is cut and capped just downstream of the root valves. The abandoned instrumentation and tubing are not within the scope of license renewal because they are isolated from the process system. For other instrumentation and tubing that is not abandoned in place and remains open to the process system, the instrumentation is within the scope of license renewal, but not subject to an AMR, in accordance with 10 CFR 54.21(a)(1)(i). The tubing is listed in Table 3.3-6 (page 3.3-55) in the LRA. Because the abandoned instrumentation and tubing are not relied upon to perform an intended function, the staff concludes that they are outside the scope of license renewal.

The staff did not identify any other omissions in the applicant's scoping review.

The staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those portions of the component cooling system that are identified as within the scope of license renewal. The applicant listed the SCs subject to an AMR for the component cooling system in Table 3.3-6 (McGuire) and Table 3.3-7 (Catawba) of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER.

The applicant identified the portions of the component cooling system that are within the scope of license renewal on drawings referenced in LRA Section 2.3.3.5. In addition, the applicant lists the mechanical components that are subject to an AMR and their intended function(s) in Table 3.3-6 (McGuire) and Table 3.3-7 (Catawba) of the LRA.

The license renewal drawings were highlighted by the applicant to identify those portions of the component cooling system that meet at least one of the scoping criteria in 10 CFR 54.4. The staff compared the LRA drawings to the system drawings and the description in the UFSAR to ensure they were representative of the component cooling system. The staff performed its review by sampling the SCs that the applicant determines as within the scope of license renewal, but not subject to an AMR, to verify that no structure or component that performs its intended function(s) without moving parts or without a change in configuration or properties, and that is not subject to replacement on the basis of qualified life or specified time period, was excluded from an AMR.

As a result of its review, the staff determined that additional information was needed to complete its review. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.5-8, additional information regarding Note 5 on Catawba 1 drawings CN-1573-1.4 and CN-1573-1.7, and Catawba 2 drawings CN-2573-1.4, and CN-2573-1.7, which indicate that the reactor coolant pump upper motor bearing cooler connection "T" on the top of the bearing cooler should be plugged. The staff did not identify a listing for this plug on Table 3.3-7, "Aging Management Review Results - Component Cooling System Catawba Nuclear Station)." In its response dated April 15, 2002, the applicant noted that reactor coolant pump upper motor bearing cooler shell nozzles shown on the flow diagrams are labeled "J," "K," "T," and "U," and that all the nozzles and the plug are considered part of the reactor coolant pump upper motor bearing shell, which is addressed in the Table 3.3-7 (page 3.3-69) of the LRA. The staff finds the applicant's response acceptable since the plug in question is within the scope of license renewal as part of the reactor coolant pump upper motor bearing shell.

In its RAI, the staff noted that Catawba 1 drawings CN-1573-1.4 and CN-1573-1.7, and Catawba 2 drawings CN-2573-1.4 and CN-2573-1.7, depict temperature elements (1KCTE5880, 1KCTE5920, 1KCTE5890, 1KCTE5930, etc.), which appear to be installed in thermowells in piping that is within the scope of license renewal. The thermowells for these temperature elements were not highlighted and were not included in Table 3.3-7, "Aging Management Review Results - Component Cooling System (Catawba Nuclear Station)." In LRA Section 2.5, "Scoping and Screening Results: Electrical and Instrumentation and Controls," the applicant noted that the pressure boundary function associated with resistance temperature detectors (RTDs) and thermocouples was considered during the process of identifying the mechanical pressure boundaries. Similarly for McGuire, drawing MCFD-573-02.02 indicates that temperature transmitters (1KCTX5340 and 1KCTX5380) in piping are within the scope of license renewal. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.5-9, the applicant to indicate if these instruments are located in thermowells and if wells are included in Table 3.3-7,

"Aging Management Review Results - Component Cooling System." If these instruments were located in wells, the staff also asked the applicant to indicate if heat transfer was an intended function of the wells.

In its response dated April 15, 2002, the applicant clarified that, on both the McGuire and Catawba mechanical flow diagrams, the instrument nomenclature identifies whether the temperature element is installed in a thermowell. The letters "TE" in the component identification number 1KCTE5880 above indicate that a temperature element is installed in a thermowell. The letters "TX" in the component identification number 1KCTX5880 above indicate that no temperature element is installed in the thermowell. The applicant stated that the portion of the thermowell that forms a mechanical system pressure boundary is within the scope of license renewal because it serves a pressure boundary function. The applicant stated that commodity type "pipe" or "piping" is used throughout the LRA to represent the host of piping pressure boundary components that must retain their pressure boundary function. These piping pressure boundary components include not only the piping itself, but also other piping-related pressure boundary components such as elbows, tees, half-couplings, and temperature element pressure boundary parts like those discussed here. The staff found the applicant's response acceptable regarding the scoping of the thermowells for pressure boundary because they are included as part of the pipe or piping commodity group.

The applicant further stated that for thermowells, pressure boundary is the only component intended function. The applicant referred to Appendix C of NEI 95-10 (Revision 3) for an understanding of the heat transfer design aspects. The applicant stated that heat transfer is a parameter considered in the design of most safety-related structures and components, but not a primary safety function like that associated with SGs and heat exchangers. For example, while the heat capacity of the containment and interior structures is included in the modeling of the pressure and temperature transient for loss-of-coolant accidents, these secondary heat transfer functions of the safety-related structures and components need not be a specific focus of the AMR for license renewal. For thermowells, heat transfer is a secondary function and does not need to be the focus of the AMR. Therefore, pressure boundary is the only component intended function of thermowells. Based on the above, the staff found the applicant's response acceptable since there is no primary safety function associated with heat transfer for thermowells in the component cooling water system.

2.3.3.5.3 Conclusions

On the basis of its review of the information contained in Section 2.3.3.5 of the LRA, the supporting information from both UFSARs and the LRA drawings, and review of the April 15, 2002, response from the applicant to the January 28, 2002, staff RAIs, the staff concludes that there is reasonable assurance that the applicant has identified those portions of the McGuire component cooling system and the Catawba component cooling system that are within the scope of license renewal and the SCs that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.6 Condenser Circulating Water System*

In LRA Section 2.3.3.6, "Condenser Circulating Water System," the applicant described the components of the condenser circulating water system that are within the scope of license renewal and subject to an AMR. This system is described in Section 10.4.5 of the McGuire and

Catawba UFSARs. The staff reviewed the LRA and the UFSARs for McGuire and Catawba to determine if the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

2.3.3.6.1 Technical Information in the Application

For both McGuire and Catawba, the condenser circulating water system is a non-safety-related cooling system relied upon to remove heat from the feedwater pump turbine and main condensers. The condenser circulating water system also provides a suction source of water to the turbine-driven auxiliary feedwater pump for events requiring the activation of the standby shutdown facility.

The applicant described the process for identifying the SSCs within the scope of license renewal in LRA Section 2.1.1, "Scoping Methodology," and its process for identifying the SSCs subject to an AMR in LRA Section 2.1.2, "Screening Methodology." Using the methodology described in LRA Section 2.1.1, the applicant listed the systems and structures that are within the scope of license renewal in LRA Tables 2.2-1 and 2.2-2 for McGuire and Catawba, respectively. The McGuire condenser circulating water system is listed on page 2.2-3 of Table 2.2-1 of the LRA. The Catawba condenser circulating water system is listed on page 2.2-7 of LRA Table 2.2-2.

Using the methodology described in Section 2.1.2 of the LRA, the applicant listed the McGuire and Catawba mechanical components that are subject to an AMR in LRA Table 3.3-8, "Aging Management Results - Condenser Circulating Water System." This table also lists the intended function of each component and the materials of construction. For both McGuire and Catawba, the applicant identified the following component types from the condenser circulating water system that are subject to an AMR—pipe, pump casings (Catawba only), valves bodies, and strainers (Catawba only). The applicant identified maintaining pressure boundary integrity as the only intended function of the SCs subject to an AMR.

2.3.3.6.2 Staff Evaluation

The staff reviewed Section 2.3.3.6 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the condenser circulating water system that are within the scope of license renewal in accordance with 10 CFR 54.4, and to verify that the applicant appropriately identified the SCs that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the information presented in Section 2.3.3.6 of the LRA and the applicable piping and instrument drawings referenced therein, and the McGuire and Catawba UFSARs, to determine if the applicant adequately identified the portions of the condenser circulating water system that are within the scope of license renewal. The staff verified that those portions of the condenser circulating water system that meet the scoping requirements of 10 CFR 54.4 were included within the scope of license renewal, and were listed by the applicant in Section 2.3.3.6 of the LRA. To verify that the applicant did include the applicable portions of the condenser circulating water system within the scope of license renewal, the staff focused its review on those portions of the condenser circulating water system that were not identified as within the scope of license renewal to verify that they did not meet the scoping criteria of 10 CFR 54.4.

As a result of this review, the staff determined that additional information was needed to complete its review. Section 10.4.5.1 of the McGuire UFSAR states that the condenser circulating water system also serves as a secondary supply for the nuclear service water system. By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.6-1, why the LRA does not mention the supply to the nuclear service water system as an intended function of the condenser circulating water system. The staff also requested the applicant to indicate if the discharge path from the nuclear service water system to the condenser circulating water system shown on drawing MCFD-1604-01.02 (C-7) provided an intended function. In its response dated April 15, 2002, the applicant noted that the condenser circulating water system only serves as a backup supply to the nuclear service water system and does not meet any of the scoping criteria of 10 CFR 54.4. The backup supply is not safety-related and not relied upon to prevent or to mitigate a design basis event. Additionally, the failure of this backup supply will not prevent the accomplishment of a safety-related function. Furthermore, the backup supply is not relied upon to demonstrate compliance with any of the Commission's regulations specified in 10 CFR 54.4(a)(3). The fully assured primary water source for the nuclear service water system is the flow-path from the nuclear service water system pumps, which is within the scope of license renewal. The applicant further stated that the license renewal evaluation boundaries shown on the connections for the nuclear service water system on drawing MCFD-1604-01.02 (C-7) are not intended to provide a path for the discharge of water. These boundaries provide a flow-path from the condenser circulating water system to the turbine-driven auxiliary feedwater pump for certain postulated events. The staff finds the applicant's response acceptable since neither the secondary supply nor the discharge path (if any) is safety-related, nor is either function relied upon for compliance with the regulations detailed in 10 CFR 54.4(a)(3).

Section 10.4.5.1 of the McGuire UFSAR notes that the condenser circulating water system also serves as the supply for the fire protection jockey pumps. By letter dated January 28, 2002, the staff asked, also in RAI 2.3.3.6-1, why the LRA does not mention the supply to fire protection jockey pumps as an intended function of the condenser circulating water system. The applicant stated that the supply to the jockey pumps is not considered an intended function of the condenser circulating water system and referred the staff to its response to a separate staff question (RAI 2.3.3.19-6) related to the scoping of jockey pumps in accordance with 10 CFR 54.4(a)(3). Although the staff finds the applicant's response to RAI 2.3.3.19-6 unacceptable because of the McGuire and Catawba licensing basis for meeting the requirements of fire protection regulations, specified in 10 CFR 50.48 (discussed in Section 2.3.3.19.2 of this SER), the staff has determined that the supply of water to the jockey pumps is not required for compliance with the fire protection regulations, and the line does not serve any other intended function. Therefore, the applicant's response to RAI 2.3.3.6-1 is acceptable.

The staff noted that for all McGuire flow diagrams referenced in the LRA for the condenser circulating water system scoping review, the license renewal boundaries are, for the most part, placed in the middle of pipe runs and not at isolable boundaries such as valves. The boundaries coincide with flags for the standby shutdown facility. By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.6-4, if these boundaries related to a particular volume of water that is contained within the piping. If so, the staff requested the applicant to explain where or how the water is contained and made available to perform its intended function. In its response dated April 15, 2002, the applicant confirmed that the license renewal boundaries correspond to the standby shutdown system boundaries for the condenser circulating water system. These boundaries approximate a volume of water that is credited as the auxiliary feedwater suction

source for a fire and station blackout event. The applicant stated that McGuire calculation MCC-1223.42-00-0003, "Determine Water Available for Secondary Side Makeup During a Security Event," Revision 3, determines the available inventory required for postulated events and was reviewed during a recent NRC inspection. NRC Inspection Report 50-369/01-06, 50-370/01-06 dated February 26, 2002, indicates that this calculation was reviewed along with other design documents and no findings were identified. Additionally, the same NRC inspector who reviewed the calculation during the above inspection also participated in the McGuire and Catawba license renewal scoping and screening inspection that was performed in March 2002. The staff found the applicant's response acceptable since the system boundaries depicted are based on calculations that determine a water volume for station blackout and fire protection safe shutdown events required to be analyzed for compliance with the regulations detailed in 10 CFR 54.4(a)(3). Since these calculations have been the subject of NRC inspection, the staff has reasonable assurance that the intended function can be met with the volume of water contained in this piping.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.6-5, the applicant to clarify whether or not the 4-inch drain lines on the suction of the Catawba condenser circulating water pumps up to the discharge of the drain valves (e.g., 1RC34) are included in license renewal scope. These lines were not highlighted on drawings CN-1604-1.0 and CN-2604-1.0 The applicant response stated that the subject 4-inch drain lines are within the scope of license renewal. While the valves and associated piping are within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off that segment of piping. The piping and valves are listed in Table 3.3-8 (pages 3.3-84 and 3.3-85) of the LRA. The staff found the applicant's clarification acceptable.

By letter dated January 28, 2002, the staff questioned, in RAI 2.3.3.6-7, the placement of license renewal boundary flags on the suction and discharge flanges of the condenser circulating water pumps, which are depicted as within scope on Catawba 1 drawing CN-1604-1.0 and Catawba 2 drawing CN-2604-1.0. In its response dated April 15, 2002, the applicant confirmed that the condenser circulating water system pumps are within the scope of license renewal, and that no flags should have been placed at the inlet and discharge of the pumps. The staff found the applicant's confirmation acceptable.

By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.6-8, the applicant to confirm that the license renewal boundary flag at coordinates C-4 on Catawba 1 drawing CN-1604-1.2 was erroneously single-sided. In its response dated April 15, 2002, the applicant confirmed that the license renewal flag was inadvertently shown as single-sided instead of double-sided. The continuation to CN-1592-1.0 is within the scope of license renewal. The staff found the applicant's confirmation acceptable.

Section 10.4.5.3 of the McGuire UFSAR addresses flooding of the turbine building from failure of the circulating water system. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.6-9, the applicant to indicate if the circulating water system expansion joints and the turbine building basement curbs protecting the openings to the auxiliary building were within the scope of license renewal. In its response dated April 15, 2002, the applicant stated that the expansion joint in question is not within the scope of license renewal because it does not meet the scoping criteria. The expansion joint failure is assumed to occur and the plant is accordingly designed with mitigative features, including curbs and flood seals. The curbs are within the scope of license renewal and are addressed as "flood curbs" in Table 3.5-2 (page 3.5-10).

Flood seals along the wall of all in-scope structures are also within the scope of license renewal and are subject to an AMR. Flood seals are addressed in Table 3.5-2 (page 3.5-16). The staff found the applicant's response acceptable because the features to mitigate failure of the expansion joint are within the scope of license renewal as required by 10 CFR 54.4(a)(2).

Section 10.4.5.3 of the Catawba UFSAR addresses the maximum water level due to a simultaneous failure of the circulating water systems on both units and the subsequent draining of all water back to the respective turbine buildings. All penetrations and passageways from the turbine or service buildings to the auxiliary building are stated to be watertight below the maximum water level, which will protect safety-related equipment from failure caused by flooding. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.6-10, the applicant to indicate if the watertight features of the penetrations and passageways between these buildings and the auxiliary building have been included within the scope of license renewal in accordance with 10 CFR 54.4 paragraph (a)(2). In its response dated April 15, 2002, the applicant stated that the watertight features of the penetrations and passageways between the auxiliary and turbine/service buildings have been included within the scope of license renewal. The features include curbs, flood seals, and flood doors. Curbs are addressed in Table 3.5-2 (page 3.5-10). Flood seals are addressed in Table 3.5-2 (page 3.5-16). Flood doors are addressed in Table 3.5-2 (page 3.5-13). The staff found the applicant's response acceptable because the features relied upon to mitigate failure of the circulating water systems on both units are within the scope of license renewal as required by 10 CFR 54.4(a)(2).

The staff did not identify any other omissions in the applicant's scoping review.

The staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those portions of the condenser circulating water system that are identified as within the scope of license renewal. The applicant listed the SCs subject to an AMR for the condenser circulating water system in LRA Table 3.3-8 using the screening methodology described in Section 2.1 of the LRA. The staff's evaluation of the scoping and screening methodology is documented in Section 2.1 of this SER.

The applicant identified the portions of the condenser circulating water system that are within the scope of license renewal by drawings referenced in LRA Section 2.3.3.6. In addition, the applicant lists the mechanical components that are subject to an AMR and their intended function (pressure boundary) in Table 3.3-8 of the LRA.

The license renewal drawings were highlighted by the applicant to identify those portions of the condenser circulating water system that meet at least one of the scoping criteria of 10 CFR 54.4. The staff compared the LRA drawings to the system drawings and the description in the FSAR to ensure they represented the condenser circulating water system. The staff performed its review by sampling the SCs that the applicant determines are within the scope of license renewal, but not subject to an AMR to verify that no structure or component that performs its intended function(s) without moving parts or without a change in configuration or properties, and that is not subject to replacement on the basis of qualified life or specified time period, was excluded from an AMR.

As a result of this review, the staff determined that additional information was needed to complete its review. The staff noted that red highlighting was used for the expansion joints (2RC7, etc.) on the discharge of the condenser circulating water pumps for Catawba 2 on

drawing CN-2604-1.0, whereas the corresponding joints were depicted as within the license renewal boundary for Catawba 1 with blue highlighting. By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.6-6, if the difference in color signified some distinction for these components. The staff additionally asked why expansion joints were not listed as a component subject to an AMR in Table 3.3-8. In its response dated April 15, 2002, the applicant stated that the red highlighting of the expansion joints was an inadvertent result of the conversion of the drawing from one electronic format to another. The color change has no significance. The expansion joints were inadvertently omitted from Table 3.3-8 of the LRA. In its response, the applicant provided a supplement to Table 3.3-8, "Aging Management Review Result - Condenser Circulating Water System (Catawba only)," with the required information relating to an AMR. Since the expansion joints were included in the scope of license renewal, the staff found the applicant's response acceptable. The staff's evaluation of the AMR results for the expansion joints is documented in Section 3.3.6.2.1 of this SER.

The staff did not identify any other omissions.

2.3.3.6.3 Conclusions

The staff reviewed the information contained in Section 2.3.3.6 of the LRA, the supporting information from both UFSARs and the LRA drawings, and the applicant's responses to staff RAIs. On the basis of its review, the staff concludes that there is reasonable assurance that the applicant has identified those portions of the McGuire condenser circulating water system and the Catawba condenser circulating water system that are within the scope of license renewal, and the SCs that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.7 Containment Ventilation Systems*

In Section 2.3.3.7 of the LRA titled, "Containment Ventilation Systems," the applicant did not identify any portions of the containment ventilation (VP) systems or mechanical components that are within the scope of license renewal and subject to an AMR. Sections 9.4.5 and 9.4.6 of the McGuire and Catawba UFSARs, respectively, state that the VP systems are not considered ESFs, and no credit has been taken for the operation of any subsystem or component in analyzing accident consequences.

2.3.3.7.1 Technical Information in the Application

The VP systems provide adequate capacity to ensure that defined temperatures are maintained in the various portions of the containment under operating and shutdown conditions in all types of weather. Sufficient redundancy is included to ensure proper operation of the systems with one active component out of service. The systems can also purge the in-core instrumentation room atmosphere so that necessary entry may be achieved.

In Section 2.3.3.7 of the LRA, and Sections 9.4.5 and 9.4.6 of the McGuire and Catawba UFSARs, respectively, the applicant stated that the VP systems are not considered ESFs. This statement is based on the applicant's review pursuant to 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2).

For McGuire and Catawba, Section 2.3.3.7 of the LRA sates—

- The VP systems provide cooling to the upper and lower compartments of containment during normal operation and shutdown.
- The VP systems provide required post-accident monitoring in accordance with the equipment qualification rule.

Based on the above, no mechanical components have any intended passive functions subject to a scoping review, therefore, no AMR is required.

2.3.3.7.2 Staff Evaluation

The staff reviewed Section 2.3.3.7 of the LRA and supporting information in the McGuire and Catawba UFSARs, Sections 9.4.5 and 9.4.6, respectively. The staff concludes that, since the VP system is not an ESF system and is not relied on to ensure that 10 CFR Part 100 limits are not exceeded, this system is not within the scope of license renewal and subject to an AMR pursuant to 10 CFR 54.4 and 10 CFR 54.21, respectively.

2.3.3.7.3 Conclusion

On the basis of its review, the staff finds that the VP systems structures and components need not be in the scope of license renewal or subject to an AMR pursuant to 10 CFR 54.4 and 10 CFR 54.21, respectively.

*2.3.3.8 Control Area Ventilation System and Chilled Water System*

The control area ventilation (VC) system is discussed in Section 2.3.3.8.1 of this SER, and the control area chilled water (YC) system is discussed in Section 2.3.3.8.2 of this SER.

2.3.3.8.1 Control Area Ventilation System

In LRA Section 2.3.3.8, "Control Area Ventilation System and Chilled Water Systems," the applicant identified portions of the VC system that are within the scope of license renewal and subject to an AMR. The applicant noted in Section 2.3.3.8 of the LRA that the VC system is further described in Sections 6.4 and 9.4.1 of the McGuire and Catawba UFSARs, respectively.

The applicant evaluated component supports for equipment, ventilation ductwork, pipe, and instrument lines in Section 2.4.3 and Table 3.5-3 of the LRA. The staff scoping evaluations of component supports and electrical components are provided in Sections 2.4 and 2.5, respectively, in this SER. Instrument line components in the VC system were evaluated in Section 2.1 of the LRA.

2.3.3.8.1.1 Technical Information in the Application

The VC system is an ESF system designed to maintain the environment in the control room, control room area, and switchgear rooms within acceptable limits for the operation of unit controls, for maintenance and testing of the controls as required, and for uninterrupted safe occupancy of the control room during a post-accident shutdown. The control room and other portions of the control area are designed to maintain proper temperatures according to site

specifications. These conditions are maintained continuously during all modes of operation for the protection of control instrumentation and for the comfort of the operators.

Continuous pressurization of the control room proper is provided to prevent entry of dust, dirt, smoke, and radioactivity originating outside the pressurized zones. The control room envelope pressurization is slightly positive relative to the pressure outdoors and in surrounding areas. Outdoor air for pressurization can be taken from two locations, such that a source of less contaminated air is available regardless of wind direction. Each intake is located outside of the reactor building diametrically opposite to that unit's vent. Each outside air intake location is monitored for the presence of radioactivity, chlorine, and combustion products. If a high radiation level, chlorine concentration, or a smoke concentration is detected in the intake, station procedures direct the operator to manually close the most contaminated intake. This will ensure continuous control room positive pressure during a smoke or radiation event. Each of the outside air intakes is provided with a tornado isolation damper to prevent a depressurization of the control room and the control room area during a tornado occurrence.

The VC system consists of the following subsystems—

- control room ventilation subsystem
- control room area ventilation subsystem
- control room and control room area pressurizing subsystem
- switchgear room ventilation subsystem

The VC subsystems serving the above areas are described in detail in Section 6.4 of the McGuire UFSAR and in Section 9.4.1 of the Catawba UFSAR.

In Section 2.3.3.8 of the LRA and Sections 6.4 and 9.4.1 of the McGuire and Catawba UFSARs, respectively, the applicant identified the following VC system intended functions based on 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2)—

McGuire

Section 2.3.3.8 of the LRA—

- to provide the normal and emergency ventilation requirements to the control room and control room area

Section 6.4 of the UFSAR—

- to maintain the proper temperatures and cleanliness in the control room, the control room area, and the switchgear rooms during plant operation, plant shutdown, post-accident conditions, and all possible weather conditions
- to maintain the proper post-accident pressurization of the control room
- to allow absolute and carbon filtration in the outside air intakes
- to align VC system air handling units with filter units upon receipt of the ESF signal
- to regulate the maximum radiation dose received by control room personnel under accident conditions within the limits of General Design Criterion (GDC) 19
- to provide VC system instrumentation for controlling and indicating temperature, radioactivity levels, and provide an early warning of smoke

Catawba

Section 2.3.3.8 of the LRA—

- to provide normal and emergency ventilation requirements to the control room and control room area

Section 9.4.1 of the UFSAR—

- to maintain the environment in the control room, control room area, and switchgear rooms within acceptable limits for the operation of unit controls, for maintenance and testing, and for uninterrupted safe occupancy of the control room during a post-accident shutdown
- to provide continuous pressurization of the control room proper and prevent entry of dust, dirt, smoke, and radioactivity originating outside the pressurized zones
- to monitor for the presence of radioactivity, chlorine, and products of combustion during all plant operational modes

On the basis of the intended functions identified above for the McGuire and Catawba VC system, the portions of this system that were identified by the applicant as within the scope of license renewal include all VC system safety-related components (electrical, mechanical, and instruments). The applicant described its methodology for identifying the mechanical components subject to an AMR in Section 2.1 of the LRA. On the basis of this methodology, the applicant identified the portions of the VC system that are within the scope of license renewal on the flow diagrams listed in Section 2.3.3.8 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical components and component types subject to an AMR that are within the evaluation boundaries highlighted on the flow diagrams and identified their intended functions. The applicant provided this list in Table 3.3-11 of the LRA.

The following component types are identified as within the scope of license renewal and subject to an AMR in Table 3.3-11 of the LRA—heat exchanger - shells, tube sheets and tubes, filter trains, ductwork, orifices (McGuire only), prefilters (McGuire only), tubing, and valve bodies. The applicant noted in Table 3.3-11 of the LRA that pressure boundary, heat transfer, and filtration are the applicable intended functions of VC system components subject to an AMR.

2.3.3.8.1.2 Staff Evaluation

To verify that the applicant identified the components of the VC system that are within scope of the license renewal and subject to an AMR, pursuant to 10 CFR 54.4 and 10 CFR 54.21(a)(1), the staff reviewed the flow diagrams listed in Section 2.3.3.8 of the LRA that show the evaluation boundaries for the highlighted portion of the VC system within the scope of the LRA. The staff reviewed Table 3.3-11 of the LRA, which lists mechanical components and the applicable intended functions within the scope of the license renewal and subject to an AMR. The staff also reviewed Sections 6.4 and 9.4.1 of the McGuire and Catawba UFSARs, respectively, to determine if there were any portions of the VC system that met the scoping criteria in 10 CFR 54.4(a), but were not identified as within the scope of license renewal. The staff also reviewed the respective UFSARs sections to determine if any safety-related system functions were not identified as intended functions in the LRA, and to determine if any structures or

components that have intended functions were omitted from the scope of structures or components that require an AMR. The staff compared the functions described in the UFSARs to those identified in the LRA.

The applicant identified the structures and components subject to an AMR for the VC system using the screening methodology described in Section 2.1 of the LRA and listed them in Table 3.3-11 of the LRA. The staff evaluated the scoping and screening methodology, and documented its findings in Section 2.1 of this report. The staff sampled structures and components from Table 3.3-11 of the LRA to verify that the applicant identified structures and components subject to an AMR. The staff also sampled structures and components that were within the scope of license renewal but not subject to an AMR. Based on the sample, the staff verified that these structures and components perform their intended functions without moving parts or without a change in configuration or properties, and are not subject to replacement on the basis of a qualified life or specified time period.

To ensure that those portions of the VC system excluded from the scope of license renewal do not perform any intended functions, the staff requested additional information. The staff noted that Section 2.3.3.8 of the LRA provides a summary description of the system functions and a listing of flow diagrams. The flow diagrams highlight the evaluation boundaries, and Table 3.3-11 of the LRA tabulates the components within the scope and subject to an AMR for the VC system. The corresponding drawings and the UFSARs, however, show additional structures and components that were not listed in Table 3.3-11 of the LRA.

The staff noted that the applicant did not identify housings for active components that require an AMR. The determination should consider whether failure of the housing would result in a failure of the associated active component to perform its intended function and whether the housing meets the long-lived and passive criteria as defined in the rule.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-1, specific information concerning the exclusion of housings for fans and air handling units from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that cooling fans are not included in the AMR results tables in the LRA. The applicant added that cooling fans, without subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and determined that the applicant's basis for excluding housings for fans and air handling units is not consistent with the license renewal rule because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within scope. Furthermore, because the fan housings are passive and long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-1.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-2, specific information concerning the exclusion of damper housings from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that dampers are not included in the AMR result tables in the LRA. The applicant added that ventilation dampers, without sub-component exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and has determined that the applicant's basis for excluding damper housings is not consistent with the license renewal rule, because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within scope. Furthermore, because the damper housings are passive and long-lived components,

they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-2.

In its response to open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the control area ventilation system fan and damper housings that are in scope at McGuire and Catawba. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open items 2.3-1and 2.3-2. The applicant indicated that the aging effects will be adequately managed such that the intended functions of the fans and dampers will be maintained consistent with the current licensing basis for the period of extended operation. The staff's evaluation of the AMR results is documented in Section 3.3.8.2 of this SER. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-4, specific information concerning the exclusion of building sealants from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that it does not classify materials such as sealants as structures or components. The applicant stated the pressure boundary function is addressed by TS surveillance testing. However, the applicant did not indicate that any of the TS surveillance requirements listed in its response were credited for aging management (and identified as AMPs). Nor did the applicant furnish a description of, or information pertaining to, a TS surveillance AMP (including discussion of the 10 elements of the AMP) for the staff's review.

On page 2.1-24 of the LRA, the applicant stated that "seals associated with maintaining pressure boundary are limited to the divider barrier seals in the reactor building." Since the applicant does not discuss the treatment of structural sealants other than the divider barrier seal, it is not clear to the staff that building (structural) sealants were considered during an AMR of the structure (building) for which they are a subcomponent. Furthermore, according to page 3.5-10 of the LRA, the Inspection Program for Civil Engineering Structures and Components is credited by the applicant to monitor the aging of building concrete structural components (reinforced concrete beams, columns, floor slabs, and walls). According to Section B.3.21, of Appendix B of the LRA, the scope of the Inspection Program for Civil Engineering Structures and Components does not include structural sealants. Table 2.1-3, on page 2.1-15 of the SRP-LR, states that an applicant's structural AMP is expected to address structural sealants "with respect to an AMR program." The intent of this statement is that an applicant's structural AMP is expected to manage or monitor the aging effects of the structure and associated subcomponents that are identified during the AMR. The basis for this SRP guidance is documented in the summary (issued January 21, 2000,) of a December 8, 1999, meeting to discuss the staff's position on the treatment of consumables. This summary clearly states, on page 3, that structural sealants would be implicitly included at the component level and considered during the AMR. Since the structural AMP identified for the concrete structural components does not address structural sealants, and since that applicant did not identify the TS surveillances listed in its response as AMPs or provide appropriate information to support the staff's review of these surveillances as AMPs, the staff characterized this issue as SER open item 2.3-3.

In its response to this open item, dated October 28, 2002, the applicant credited a visual inspection of the structural sealant used to maintain ventilation pressure boundary integrity of the control room area, emergency core cooling pump rooms, annulus, and fuel handling building. On the basis of the information provided, the staff finds the applicant's response sufficient to

resolve open item 2.3-3. The staff's evaluation of the Ventilation Area Pressure Boundary Sealants Inspection Program is provided in Section 3.0.3.19 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-5, specific information concerning the exclusion of passive components associated with ductwork from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant identified these passive components as subcomponents of ductwork. The applicant also stated that ventilation grills were installed only for aesthetic purposes and perform no intended license renewal function. Because the components serve only aesthetic purposes and perform no intended function, the staff concludes they are outside the scope of license renewal.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-6, specific information concerning the main control room ventilation system and specific components that had not been subjected to an AMR. In its response dated April 15, 2002, the applicant stated that ventilation dampers and cooling fans are not included in the AMR results tables in the LRA. The applicant also stated that ventilation dampers and cooling fans, without subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and has determined that the applicant's basis for excluding cooling fan and damper housings is not consistent with the license renewal rule because the housings are passive components that are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within scope. Furthermore, because the fan and damper housings are passive and long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open items 2.3-1 and 2.3-2.

In its response to open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the control area ventilation system fan and damper housings that are in scope at McGuire and Catawba. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open items 2.3-1 and 2.3-2. The applicant indicated that the aging effects will be adequately managed such that the intended functions of the fans and dampers will be maintained consistent with the current licensing basis for the period of extended operation. The staff's evaluation of the AMR results is documented in Section 3.3.8.2 of this SER. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-7(2), specific information concerning the exclusion of housings for moisture eliminators and prefilters from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant identified moisture eliminators and prefilters as subcomponents of the Catawba control room area pressurizing filter trains that are subject to an AMR. The staff finds the applicant's response acceptable based on the information provided.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-8(1), specific information concerning the exclusion of the control area ventilation orifice from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that the control area ventilation orifice is identified as being within scope and subject to an AMR in Table 3.3-11 of the LRA on page 3.3-112. Because the applicant had determined that the ventilation orifice is within scope and subject to an AMR, the staff finds the applicant's response acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-8(2), specific information concerning the exclusion of the McGuire air handling unit heat exchanger shells and pre-filter components from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that the McGuire air handling unit heat exchanger shells and pre-filter components were within scope, and that the highlighting was simply drawn through components instead of using LRA flags on flow diagrams. Because the applicant had determined that the air handling unit heat exchangers are within the scope and subject to an AMRs, the staff finds the applicant's response acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-3, specific information concerning the exclusion of radiation monitors, smoke detectors, air flow monitors, and chlorine monitors from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that, based on guidance provided in NEI 95-10, Revision 3, radiation monitors, smoke detectors, and chlorine detectors are not considered passive components and are therefore not subject to an AMR. Because the monitors and detectors do not perform any intended function, the staff finds the applicant's response acceptable.

Some components that are common to many systems, including the VC system, have been evaluated separately by the applicant in Section 2.1.2.1.2 of the LRA as "replace on condition" commodities. The staff's evaluation of applicant's treatment of these consumables is documented in Section 2.1.3.2.1 of this SER.

The staff reviewed the LRA, supporting information in the UFSARs, and the applicant's responses to RAIs. In addition, the staff sampled several components from the VC system flow diagram, as identified in Section 2.3.3.8 of the LRA, to determine whether the applicant properly identified the components as within scope and subject to an AMR. No omissions were identified, except as identified in the RAIs.

2.3.3.8.1.3 Conclusions

On the basis of its review, and with the resolution of open items identified in this SER section, the staff has reasonable assurance that the applicant has adequately identified the VC system structures and components 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, respectively.

2.3.3.8.2 Control Area Chilled Water System

In LRA Section 2.3.3.8, "Control Area Ventilation System and Chilled Water System," the applicant described the components of the control area chilled water system that are within the scope of license renewal and subject to an AMR. The control area chilled water system is described in Section 6.4 and 9.4.1 of the McGuire and Catawba UFSARs, respectively. The staff reviewed the LRA and the McGuire and Catawba UFSARs to determine if the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

2.3.3.8.2.1 Technical Information in the Application

For both McGuire and Catawba, the control area chilled water system is a safety-related cooling system relied upon to remove heat from the control area ventilation system.

The applicant described the process for identifying the SSCs within the scope of license renewal in LRA Section 2.1.1, "Scoping Methodology," and its process for identifying the SSCs subject to an AMR in LRA Section 2.1.2, "Screening Methodology." Using the methodology described in LRA Section 2.1.1, the applicant listed the systems and structures that are within the scope of license renewal in LRA Tables 2.2-1 and 2.2-2 for McGuire and Catawba, respectively. The McGuire control area chilled water system is listed on page 2.2-3 of LRA Table 2.2-1. The Catawba control area chilled water system is listed on page 2.2-7 of LRA Table 2.2-2.

Using the methodology described in Section 2.1.2 of the LRA, the applicant listed the McGuire and Catawba mechanical components that are subject to an AMR in Table 3.3-9, "Aging Management Results - Control Area Chilled Water System (McGuire Nuclear Station)," and Table 3.3-10, "Aging Management Results - Control Area Chilled Water System (Catawba Nuclear Station)," respectively. These tables also list the intended functions of each component and the materials of construction. For both McGuire and Catawba, the applicant identified the following components from the control area chilled water system that are subject to an AMR—pump casings, condenser—tubes, condenser tube sheets, shells, and channel heads, economizers, evaporator—tubes, tube sheets, channel heads, and shells, oil cooler—tubes, tube sheets, channel heads, and shells, oil filters, oil separators, tanks, orifices, pipes, strainers, tubing, valves bodies, filters (Catawba only), chemical feeders (McGuire only), and flow indicators (McGuire only). The applicant further identified the intended functions of these component types to be maintaining the integrity of the control area chilled water system, transferring heat, filtration, and throttling flow.

2.3.3.8.2.2 Staff Evaluation

The staff reviewed Section 2.3.3.8 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the control area chilled water system that are within the scope of license renewal in accordance with 10 CFR 54.4, and to verify that the applicant appropriately identified the SCs that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the information presented in Section 2.3.3.8 of the LRA and the applicable piping and instrument drawings referenced therein, and the McGuire and Catawba UFSARs, to determine if the applicant adequately identified the portions of the control area chilled water system that are within the scope of license renewal. The staff verified that those portions of the control area chilled water system that meet the scoping requirements of 10 CFR 54.4 were included within the scope of license renewal and were so identified by the applicant in Section 2.3.3.8 of the LRA. To verify that the applicant did include the applicable portions of the control area chilled water system as within the scope of license renewal, the staff focused its review on those portions of the control area chilled water system that were not identified as within the scope of license renewal to verify that they did not meet the scoping criteria of 10 CFR 54.4.

As a result of this review, the staff determined that additional information was needed to complete its review. The staff noted that vent and drain lines on control area chilled water pump P-1 up to valves 1YC0011 and 1YC0012 (McGuire drawing MCFD-1618-01.00 - L-7) were not highlighted as within license renewal scope. The license renewal highlighting was omitted from several other segments of valved vent lines on this drawing (1YC0070 and 1YC0059). By letter dated January 28, 2002, the staff asked the applicant, in RAI 2.3.3.8-2, if these segments of

valved vent lines were within the scope of license renewal. In its response dated April 15, 2002, the applicant stated that the vent and drain lines on control area chilled water system pump P-1 up to valves 1YC0011 and 1YC0012, and the vent lines associated with valves 1YC0070 and 1YC0059, are within the scope of license renewal. While the valves and associated piping are within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off that segment of piping. The piping and valves are listed in Table 3.3-9 (pages 3.3-96 and 3.3-98) of the LRA. The staff found the applicant's response acceptable.

The staff noted that two refrigerant lines for chiller C-1 (between the condenser and the economizer and between the compressor and the oil cooler) were omitted from the scope of license renewal according to McGuire drawing MCFD-1618-04.00. By letter dated January 28, 2002, the staff requested the applicant, in RAI 2.3.3.8-4, to confirm that this refrigerant line was within the scope of license renewal. In its response dated April 15, 2002, the applicant stated that the two refrigerant lines are within the scope of license renewal. While the piping is within the license renewal boundary defined by license renewal flags, highlighting was inadvertently left off that segment of piping. The piping is listed in Table 3.3-9 (page 3.3-96) of the LRA. The staff found the applicant's response acceptable.

The staff noted that Catawba control area chilled water system LRA drawings CN-1578-2.0, 2.1, 2.2, 2.3, 2.4, and 2.5 all depict one or more thermowells installed within segments of piping that are within the scope of license renewal. However, the thermowells themselves were not highlighted, nor were there any entries for thermowells in Table 3.3-10, "Aging Management Review Results - Control Area Chilled Water System." By letter dated January 28, 2002, the staff requested the applicant, in RAI 2.3.3.8-6, to confirm that these thermowells are within scope for license renewal and address whether the thermowells should be included for AMR of their heat transfer component function in addition to pressure boundary. In its response dated April 15, 2002, the applicant confirmed that thermowells are within the scope of license renewal as part of the piping commodity listed in LRA Tables 3.3-6 and 3.3-7. The applicant stated that pressure boundary is the only intended function of the thermowells and referred to its response to a similar RAI on thermowells.

The applicant's response to this RAI clarified that, on both the McGuire and Catawba mechanical flow diagrams, the instrument nomenclature identifies whether the temperature element is installed in a thermowell. The letters "TE" in the component identification number 1KCTE5880 above indicate that a temperature element is installed in a thermowell. The letters "TX" in the component identification number 1KCTX5880 above indicate that no temperature element is installed in the thermowell. The applicant stated that the portion of the thermowell that forms a mechanical system pressure boundary is within the scope of license renewal because it serves a pressure boundary function. The applicant stated that commodity type "pipe" or "piping" is used throughout the LRA to represent the host of piping components that have a pressure boundary function. These piping pressure boundary components include not only the piping itself but other piping-related components, such as elbows, tees, half-couplings, and temperature elements. The staff found the applicant's response acceptable because thermowells are included as part of the pipe or piping commodity group.

The applicant further stated that for thermowells, pressure boundary is the only component intended function. The applicant referred to Appendix C of NEI 95-10 (Revision 3) for an understanding of the heat transfer design aspects. The applicant stated that heat transfer is a parameter considered in the design of most safety-related structures and components, but not a

primary safety function like that associated with steam generators and heat exchangers. For example, while the heat capacity of the containment and interior structures is included in the modeling of the pressure and temperature transient for loss-of-coolant accidents, these secondary heat transfer functions of the safety-related structures and components need not be a specific focus of the AMR for license renewal. For thermowells, heat transfer is a secondary function and does not need to be the focus of the AMR. Therefore, pressure boundary is the only component intended function of thermowells. Based on the above, the staff finds the applicant's response acceptable since there is no primary safety function associated with heat transfer for thermowells in the control area chilled water system.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.8-8, why the tubing to (apparent) back-pressure-regulating valves 1YC116 and 1YC72, shown on drawings CN-1578-2.0 and CN-1578-2.2, was not depicted as within the scope of license renewal for pressure boundary function. In its response dated April 15, 2002, the applicant stated that these valves are Fisher self-contained pressure control valves. The piping, tubing, and valves associated with these pressure-regulating valves are within the scope of license renewal and subject to an AMR. Highlighting for the small interconnecting portion from the process line to the valve controller on drawing CN-1578-2.0 was inadvertently left off. The piping, tubing, and associated valves are listed in LRA Table 3.3-10. The staff found the applicant's response acceptable.

Aside from the errors in the boundaries on the LRA drawings and other items discussed above, the staff did not identify any omissions in the applicant's scoping review.

The staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those portions of the control area chilled water system that are identified as within the scope of license renewal. The applicant listed the SCs subject to an AMR for the control area chilled water system in Table 3.3-9 (McGuire) and Table 3.3-10 (Catawba) of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The applicant identified the portions of the control area chilled water system that are within the scope of license renewal by drawings referenced in LRA Section 2.3.3.8. In addition, the applicant lists the mechanical components that are subject to an AMR and their intended function(s) in Table 3.3-9 (McGuire) and Table 3.3-10 (Catawba) of the LRA.

The license renewal drawings were highlighted by the applicant to identify those portions of the control area chilled water system that meet at least one of the scoping criteria of 10 CFR 54.4. The staff compared the LRA drawings to the system drawings and the description in the FSAR to ensure they were representative of the control area chilled water system. The staff performed its review by sampling the SCs that the applicant determined to be within the scope of license renewal, but not subject to an AMR, to verify that no structure or component that performs its intended functions without moving parts or without a change in configuration or properties, and that is not subject to replacement on the basis of qualified life or specified time period. was excluded from an AMR.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.8-1, why airtrol tank fittings within the license renewal boundaries on McGuire LRA drawing MCFD-1618-01.00, and Catawba LRA drawings CN-1578-2.0 and CN-1578-2.2, did not have corresponding entries in Tables 3.3-9 and 3.3-10, "Aging Management Review Results - Control Area Chilled Water System." In its response dated April 15, 2002, the applicant stated that the airtrol tank fittings depicted on

drawings MCFD-1618-01.00, CN-1578-2.0, and CN-1578-2.2 are valves used to adjust the level in the compression tanks to compensate for expansion and contraction of the fluid in the chilled water system. These valves are included in the "Valve Bodies" commodity entry in Table 3.3-9 (pages 3.3-97 and -98) and in Table 3.3-10 (pages 3.3-108 and -109) of the LRA. The staff found the applicant's response acceptable.

By letter dated January 28, 2002, the staff asked, in RAI 2.3.3.8-3, why there are no entries for the compressor shells or cases in Tables 3.3-9 and -10, "Aging Management Review Results - Control Area Chilled Water System (McGuire Nuclear Station) and (Catawba Nuclear Station)," respectively. The compressors are depicted as within license renewal scope on LRA drawings MCFD-1618-04.00, CN-1578-2.4, and CN-1578-2.5. In its response dated April 15, 2002, the applicant noted that although the compressors are within the scope of license renewal, they are not included in the AMR results tables in the LRA. The applicant further noted that compressors, without sub-component exceptions, are explicitly excluded from an AMR by 10 CFR 54.21(a)(1)(i). The staff found the applicant's response acceptable since compressors are specifically excluded from an AMR by the regulations.

The staff noted that Catawba control area chilled water system LRA drawings CN-1578-2.0, -2.1, -2.2, and -2.3 all have a note—

> Actuator failed to the normally open position, power/control wiring disconnected and hydraulic fluid drained from actuator. Valve position maintained by actuator spring.

These notes apply to various two-way valves that would bypass flow from the fan coolers in the alternate position. By letter dated January 28, 2002, the staff stated, in RAI 2.3.3.8-7, that these valves appeared to be passive devices held in the intended position by the springs and requested that the applicant either address why these springs are not subject to an AMR (to ensure they retain the ability to maintain the position and passive nature of these valves) or provide a basis for why these components are considered active and not subject to an AMR. In its response dated April 15, 2002, the applicant stated that all valve components (actuators, operators, disks, stems, springs, etc.), except for valve bodies, are excluded from AMR in accordance with 10 CFR 54.21(a)(1)(i). The staff believed that the applicant's response did not address the specific question regarding the active designation of these valves actuators because, with the stated configuration, there were no apparent moving parts or change in configuration or properties, and the applicant did not document plans to replace the valves on the basis of qualified life or specified time period.

In electronic correspondence dated May 2, 2002 (ADAMS Accession No. ML021440229), the applicant provided clarification that the spring, which is a piece/part of the actuator, is in a relaxed state and not compressed. In the event the valve stem attempts to reposition by some unknown force, the spring would compress slightly and then restore the valve to its initial position. Compression of the spring is a change of state. In addition, the flow through the valve itself tends to keep the valve open. In the unlikely event that the spring fails and the valve stem repositions, there is no impact on the pressure boundary function of the system components. By letter dated July 9, 2002, the applicant provided this explanation of the actuator's design and configuration in official correspondence. The staff considers the applicant's position acceptable since it clarifies that the valves are open and flow will tend to keep the valve open, and the actuator will provide force to close the valve through the compression of the spring in the event the valves in question attempt to reposition.

2.3.3.8.2.3 Conclusions

On the basis of its review of the information contained in Section 2.3.3.8 of the LRA, the supporting information from the McGuire and Catawba UFSARs, LRA drawings, and the responses to RAIs, the staff concludes that there is reasonable assurance that the applicant has identified those portions of the McGuire control area chilled water system and the Catawba control area chilled water system that are within the scope of license renewal and the SCs that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.9 Conventional Waste Water Treatment System*

In LRA Section 2.3.3.9, "Conventional Waste Water Treatment System," the applicant described the components of the conventional waste water treatment system that are within the scope of license renewal and subject to an AMR. The system is described in Section 9.2.8 of the McGuire UFSAR. Because of the design differences between McGuire and Catawba, the following staff evaluation applies to McGuire only.

2.3.3.9.1 Technical Information in the Application

The conventional waste water treatment system at McGuire maintains low water level in the standby shutdown facility (SSF) sump to prevent flooding of SSF equipment. The similar system at Catawba does not meet the license renewal scoping criteria.

The applicant described the process for identifying the mechanical components that are within the scope of license renewal in LRA Section 2.1.1, "Scoping Methodology." As described in the scoping methodology, the applicant identified the portions of the conventional waste water treatment system that are within the scope of license renewal on the P&IDs that are listed in LRA Section 2.3.3.9. Consistent with the method described in LRA Section 2.1.2, "Screening Methodology," the applicant listed the conventional waste water treatment system mechanical components that are subject to an AMR in LRA Table 3.3-12. This table also lists the component functions. Specifically, the applicant identified the following components as subject to an AMR—piping, pump casing, and valve bodies. The applicant stated that the intended component functions are to maintain pressure boundary.

2.3.3.9.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.9 to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the conventional waste water treatment system that are within the scope of license renewal in accordance with 10 CFR 54.4(a) and that the applicant appropriately identified the SCs that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the information provided in LRA Section 2.3.3.9, the applicable P&IDs referenced therein, and the McGuire UFSAR to determine if the applicant adequately identified the portions of the conventional waste water treatment system that are within the scope of license renewal. The staff verified that those portions of the conventional waste water treatment system that meet the scoping requirements of 10 CFR 54.4(a) were included within the scope of license renewal and were identified by the applicant in Section 2.3.3.9 of the LRA.

In LRA Section 2.3.3.9, the applicant listed applicable P&IDs for the conventional waste water treatment system. The detailed diagrams are highlighted to identify those portions of the system that are within the scope of license renewal. The staff compared the LRA diagrams to the system drawings and descriptions in the UFSAR to ensure that the diagrams were representative of the conventional waste water treatment system. To verify that the applicant included the applicable portions of the conventional waste water treatment system within the scope of license renewal, the staff focused its review on those portions of the conventional waste water treatment system that were not identified as within the scope of license renewal and verified that they did not meet the scoping criteria of 10 CFR 54.4(a). In addition, the staff reviewed the UFSAR for each facility to identify any additional system functions that were not identified in the LRA, and verified that the additional functions did not meet the scoping requirements of 10 CFR 54.4(a).

In reviewing the LRA, the staff noticed that some of the components designated as within the scope of license renewal for McGuire were not identified as within the scope of license renewal for Catawba. The staff reviewed the UFSAR in an attempt to understand the reason for these differences, but could not find an explanation. In a conference call on September 12, 2001, the staff requested that the applicant clarify the differences in design between Catawba and McGuire that resulted in these differences in scoping. The applicant explained that the SSF sump pump was included within the scope of license renewal at McGuire because credible events involving pipe breaks could cause flooding of the SSF building, which might affect the SSF equipment. Because the piping configuration at Catawba is different, the applicant did not identify any credible pipe breaks that could cause flooding of the SSF. The Catawba SSF sump pump is not required for the mitigation of flooding effects. The applicant's explanation of why the flood-mitigating function at McGuire was not warranted at Catawba clarified these scoping differences between the two plants. On the basis of the above review, the staff did not identify any omissions by the applicant in the scoping of mechanical components according to 10 CFR 54.4(a).

The staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those portions of the conventional waste water treatment system that were identified as within the scope of license renewal. The applicant used the screening methodology described in LRA Section 2.1.2 to identify the SCs subject to an AMR. The staff evaluation of the scoping and screening methodology is documented in Section 2.1 of this SER. In the LRA, the applicant identified the portions of the conventional waste water treatment system that are within the scope of license renewal in the P&IDs and listed the mechanical components that are subject to an AMR and their intended component functions in LRA Table 3.3-12. The staff performed its review by sampling the SCs that the applicant determined were within the scope of license renewal, but not subject to an AMR, to verify that no structure or component that performs its intended function without moving parts or without a change in configuration or properties, and that is not subject to replacement based on qualified life or specified time period, was excluded from an AMR. The staff did not identify any omissions by the applicant in screening SCs according to 10 CFR 54.21(a)(1).

2.3.3.9.3 Conclusions

On the basis of its review of the information contained in LRA Section 2.3.3.9, the supporting information in the P&IDs, and the McGuire UFSAR, as described above, the staff did not identify any omissions by the applicant. Therefore, the staff finds that there is reasonable assurance

that the applicant adequately identified those portions of the conventional waste water treatment system that are within the scope of license renewal and the associated SCs that are subject to an AMR in accordance with 10 CFR 54.4(a) and 54.21(a)(1), respectively.

*2.3.3.10 Diesel Building Ventilation System*

In Section 2.3.3.10 of the LRA titled, "Diesel Building Ventilation System," the applicant identified portions of the diesel building ventilation (VD) system and the components that are within the scope of the LRA and subject to an AMR. In this section of the LRA, the applicant noted that the VD system is further described in Sections 9.4.6 and 9.4.4 of the McGuire and Catawba UFSARs, respectively.

The applicant evaluated component supports for VD system ductwork in Table 3.5-3 of the LRA. The applicant evaluated electrical components that support the operation of the system in Section 2.1.2.3 of the LRA. The staff's scoping evaluation of structures and component supports is provided in Section 2.4 of this SER. The staff's evaluation of electrical components and instrumentation and controls in the VD system is documented in Section 2.5 of this SER.

2.3.3.10.1 Technical Information in the Application

The VD system is designed to provide a suitable environment for the operation of equipment and personnel access for inspection, testing, and maintenance. The VD system is designed to maintain the building temperature within both standby and operating environmental limits. Essential electrical components required for ventilation of the diesel building during accident conditions are connected to Emergency Class 1E standby power. The VD system is located completely within a Seismic Category I structure. All essential fans, dampers, ductwork, and supports are designed to withstand a safe shutdown earthquake. The diesel building ventilation air supply and exhaust openings are protected from tornado missile damage.

The McGuire and Catawba VD systems consist of the following subsystems—

Normal Ventilation Subsystems: The normal ventilation subsystems for each diesel-generator enclosure consist of a 100 percent capacity fan, shutoff damper, filter section, and associated ductwork. The normal ventilation subsystems have no standby capacity and operate only during normal plant operation (diesel off-cycle). The normal ventilation fans will be turned off when the associated diesel generators are started, either for test purposes or by an ESF actuation signal.

Emergency Ventilation Systems: The emergency ventilation subsystems (general ventilation subsystems at McGuire) for the diesel enclosures consist of two 50-percent capacity fans, ductwork, and modulating return air and outside air dampers arranged to maintain space temperature within prescribed limits when the diesel generators are operating. Excess makeup air to the diesel enclosure is relieved through automatic (pressure-operated) relief dampers.

In Section 2.3.3.10 of the LRA and Sections 9.4.6 and 9.4.4 of the McGuire and Catawba UFSARs, respectively, the applicant identified the following VD system-intended functions based on 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2)—

McGuire

Section 2.3.3.10 of the LRA—

- to maintain temperature control for each diesel building when its associated diesel generator is running

Section 9.4.6 of the UFSAR—

- to filter the outside supply air and accommodate the combustion air flow requirements for each diesel engine
- to maintain the diesel building within temperature limits
- to prevent the possibility of room air short-cycling to the combustion air intakes in the event of a fan failure

Catawba

Section 2.3.3.10 of the LRA—

- to maintain temperature control for each diesel building when the associated diesel generator is running

Section 9.4.4 of the UFSA—

- to provide a suitable environment for the operation of equipment and personnel access for inspection, testing, and maintenance
- to maintain the ambient diesel building temperature within limits

On the basis of the intended functions identified above for the McGuire and Catawba VD systems, the portions of this system that were identified by the applicant as within the scope include all VD system safety-related components (electrical, mechanical, and instruments). The applicant described its methodology for identifying the mechanical components subject to an AMR in Section 2.1 of the LRA. On the basis of this methodology, the applicant identified the portions of the VD system that are within the scope on the flow diagrams listed in Section 2.3.3.10 of the LRA. Using the scoping results methodology described in Section 2.2, the applicant compiled a list of the mechanical components and component types subject to an AMR that are within the evaluation boundaries highlighted on the flow diagrams and identified their intended functions. The applicant provided this list in Table 3.3-13 of the LRA.

The following component types are identified as within the scope of license renewal and subject to an AMR and are listed in Table 3.3-13 of the LRA—ductwork, pipe, tubing, and valve bodies. The applicant further identified the intended functions of these component types to be maintaining the integrity of the VD system pressure boundary.

2.3.3.10.2 Staff Evaluation

To verify that the applicant identified the components of the VD 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), the staff reviewed the flow diagrams listed in LRA Section 2.3.3.10 that show the evaluation boundaries for the highlighted portion of the VD system that are within the scope. The staff also reviewed Table 3.3-13 of the LRA, which lists the mechanical components and the applicable intended functions that are within the scope of the license renewal and subject to an AMR. The staff reviewed Sections 9.4.4 and 9.4.6 of the McGuire and Catawba USFARs, respectively, to determine if there were any portions of the VD system that met the scoping criteria in 10 CFR 54.4(a), but were not identified as within the scope. The staff also reviewed the McGuire and Catawba UFSARs to determine if any safety-related system functions were not identified as intended functions in the LRA, and to determine if any structures or components that have intended functions were omitted from the scope of structures or components that require an AMR. The staff compared the functions described in the UFSARs to those identified in the LRA.

The applicant identified the structures and components subject to an AMR for the VD system using the screening methodology described in Section 2.1 of the LRA and listed them in Table 3.3-13 of the LRA. The staff evaluated the scoping and screening methodology, and documented its findings in Section 2.1 of this report. The staff sampled the structures and components in Table 3.3-13 of the LRA to verify that the applicant did identify the structures and components subject to an AMR. The staff also sampled the structures and components that were within the scope of license renewal but not subject to an AMR. Based on the sample, the staff verified that these structures and components perform their intended functions without moving parts or without a change in configuration or properties, and are not subject to replacement on the basis of a qualified life or specified time period.

To ensure that those portions of the VD system excluded from scope do not perform any intended functions, the staff requested additional information. The staff noted that Section 2.3.3.10 of the LRA provides a summary description of the system functions and a list of flow diagrams. The flow diagrams highlight the evaluation boundaries and Table 3.3-13 of the LRA tabulates the components within the scope and subject to an AMR for the VD system. The corresponding drawings and above-reviewed sections of the UFSARs, however, show additional components that were not listed in Table 3.3-13 of the LRA.

The staff noted that the applicant did not identify housings for active components that require an AMR. The determination should consider whether failure of the housing would result in a failure of the associated active component to perform its intended function, and whether the housing meets the long-lived and passive criteria as defined in the rule.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-1, specific information concerning the exclusion of housings for fans and air handling units from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that cooling fans are not included in the AMR results tables in the LRA. The applicant also stated cooling fans, without subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and determined that the applicant's basis for excluding fan housings is not consistent with the license renewal rule because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within scope. Furthermore, because the fan housings are passive and long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-1.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-2 and RAI 2.3-8(3), specific information concerning the exclusion of damper housings and valve bodies from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that dampers and/or valve bodies are not included in the AMR results tables in the LRA. The applicant also stated that ventilation dampers, without subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21. The staff reviewed this response and has determined that the applicant's basis for excluding damper housings is not consistent with the license renewal rule because the housings are relied upon to maintain pressure boundary integrity (as are valve bodies and pump casings) and are within scope. Furthermore, because the damper housings are passive and long-lived components, they are subject to an AMR. The staff found this response unacceptable and characterized this issue as SER open item 2.3-2.

In its response to open items 2.3-1 and 2.3-2, dated October 28, 2002, the applicant provided AMR results tables for the diesel building ventilation system fan and damper housings that are in scope at McGuire and Catawba. On the basis of the information provided, the staff finds the applicant's response sufficient to resolve open items 2.3-1 and 2.3-2. The applicant indicated that the aging effects will be adequately managed such that the intended functions of the fans and dampers will be maintained consistent with the current licensing basis for the period of extended operation. The staff's evaluation of the AMR results is documented in Section 3.3.10.2 of this SER. Because these open items apply to a number of ventilation systems, their resolution is documented in multiple sub-sections of Sections 2.2 and 2.3 of this SER.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-7(3) and RAI 2.3.3.10-1, specific information concerning the exclusion of duct heater housings (McGuire only) from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that duct heater housings should have been highlighted on flow diagrams to indicate that they are within the scope of license renewal. The applicant further stated that the duct heaters consist of electric heating elements that are mounted inside the ductwork and do not have a pressure boundary function or any other component-intended function for license renewal and are not subject to an AMR. On the basis of the information provided related to duct heater housings, the staff finds the applicant's responses acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-8(4), specific information concerning the exclusion of pipe components (McGuire only) from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant stated that pipe components for the diesel building ventilation systems are associated with in-scope instruments that, by convention, are not highlighted on mechanical system flow diagrams. On the basis of this clarifying information, the staff finds the applicant's response acceptable.

By letter dated January 23, 2002, the staff requested, in RAI 2.3-5 and RAI 2.3-8(5), specific information concerning the exclusion of passive components associated with ductwork from the scope of license renewal and/or an AMR. In its response dated April 15, 2002, the applicant identified these passive components as subcomponents of ductwork. The applicant also stated that ventilation grilles were installed only for aesthetic purposes and perform no intended license renewal function. On the basis of the information provided, the staff finds the applicant's response acceptable.

Some components that are common to many systems, including the VD system, have been evaluated separately by the applicant in Section 2.1.2.1.2 of the LRA as "replace on condition"

commodities. The staff's evaluation of applicant's treatment of these consumables is documented in Section 2.1.3.2.1 of this SER.

In Section 2.4.3 of this report, the staff evaluated component supports for piping, cables, and equipment that supported the design and operation of the VD system. In LRA Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls," the staff evaluated electrical and instrument components that support the operation of the VD system.

The staff reviewed the LRA, supporting information in the UFSARs, and applicant's response to RAIs. In addition, the staff sampled several components from the VD system flow diagrams identified in Section 2.3.3.10 of the LRA to determine whether the applicant properly identified the components within scope and subject to an AMR. No omissions were identified, except as identified in the RAIs.

2.3.3.10.3 Conclusions

On the basis of its review, and with the open items identified in this SER section resolved, the staff has reasonable assurance that the applicant has adequately identified the VD system structures and components 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, respectively.

*2.3.3.11 Diesel Generator Air Intake and Exhaust System*

In LRA Section 2.3.3.11, "Diesel Generator Air Intake and Exhaust System," the applicant described the components of the diesel generator air intake and exhaust system that are within the scope of the license renewal and subject to an AMR. This system is described in Sections 9.5.11 and 9.5.8 of the McGuire and Catawba UFSARs, respectively. The staff reviewed the LRA and the McGuire and Catawba UFSARs to determine whether the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

The LRA refers to the "diesel generator air intake and exhaust system" for McGuire, the LRA refers to the "diesel generator air intake and exhaust system" for Catawba. For simplicity, the system will be referred to as the "diesel generator engine air intake and exhaust system" for both McGuire and Catawba.

2.3.3.11.1 Technical Information in the Application

The diesel generator air intake and exhaust system supplies air to the diesel generator engines for fuel combustion and removes exhaust from the diesel generator engines to the atmosphere outside of the building.

The applicant described the process for identifying the SSCs within the scope of license renewal in Section 2.1.1 of the LRA. Using that scoping methodology, the applicant determined that the diesel generator air intake and exhaust system was within the scope of license renewal and listed it on page 2.2-3 in Table 2.2-1 for McGuire, and page 2.2-7 in Table 2.2-2 for Catawba. The LRA included system drawings that were highlighted to indicate the license renewal evaluation boundary.

The applicant described the process for identifying the SCs subject to an AMR in Section 2.1.2 of the LRA. Using that screening methodology, the applicant listed the McGuire and Catawba mechanical components that are subject to an AMR in Table 3.3-14 of the LRA. This table also listed the intended function of each component and the materials of construction. The applicant identified the following components from the diesel generator air intake and exhaust system as subject to an AMR—silencers, filters (Catawba only), flexible connector (McGuire only), expansion joints, flexible hoses (Catawba only), pipe, tubing, and valves bodies. The applicant further identified the intended functions of these component types to be maintaining the integrity of the diesel generator air intake and exhaust system pressure boundary.

2.3.3.11.2 Staff Evaluation

The staff reviewed Section 2.3.3.11 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the diesel generator air intake and exhaust system that are within the scope of license renewal in accordance with 10 CFR 54.4, and that the applicant appropriately identified the mechanical components that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and the applicable drawings submitted by the applicant in Section 2.3.3.11 of the LRA. The staff verified that the applicant adequately identified the portions of the diesel generator air intake and exhaust system that meet the scoping requirements of 10 CFR 54.4, and that these portions were included within the scope of license renewal in Section 2.3.3.11 of the LRA. The staff focused its review on those portions of the diesel generator air intake and exhaust system that were not identified as within the scope of license renewal to verify that they did not meet the scoping requirements of 10 CFR 54.4. The staff did not identify any omissions in the applicant's scoping review.

The staff reviewed LRA Table 3.3-14, which lists the mechanical components subject to an AMR for the McGuire and Catawba diesel generator air intake and exhaust systems. The staff verified that the applicant properly identified the mechanical components that were subject to an AMR from among those portions of the diesel generator air intake and exhaust system that were identified as within the scope of license renewal. The staff sampled the components that the applicant determined to be within the scope of license renewal, but not subject to an AMR, to verify that no component that performs its intended function(s) without moving parts or without a change in configuration or properties, and that is not subject to replacement based on qualified life or specified time period, was excluded from LRA Table 3.3-14.

During its review of Section 2.3.3.11, the staff determined that additional information was needed to complete its review. According to the license renewal evaluation boundary highlighted on drawings MCFD-1609-05.00, MCFD-2609-05.00, CN-1609-5.0, and CN-2609-05.0, the air intake manifold, exhaust manifold, and turbochargers were determined to be within the scope of license renewal. The passive portions of these components (e.g., turbocharger housing and tubes) that have a pressure boundary function were not listed in LRA Table 3.3-14 as subject to an AMR. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.11-1, that the applicant provide the basis for excluding the passive components of the diesel generator air intake manifold, exhaust manifold, and turbochargers from the lists of components subject to an AMR. In its response dated April 15, 2002, the applicant stated that, even though the diesel generators and its subcomponents, such as air intake manifold, exhaust manifold, and turbochargers, are within the scope of license renewal, diesel generators, without

subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21(a)(1)(i). The staff found the applicant's response acceptable because, even though portions of the air intake manifold, exhaust manifold, and turbochargers are passive, these components are sub-components of the diesel generator, which is active and, therefore, not subject to an AMR, in accordance with 10 CFR 54.21(a)(1)(i).

2.3.3.11.3 Conclusion

On the basis of its review of the information contained in Section 2.3.3.11 of the LRA, the supporting information from both UFSARs, applicable LRA drawings, and the RAI response, the staff concluded that there is reasonable assurance that the applicant has identified those portions of the diesel generator air intake and exhaust system that are within the scope of license renewal and those that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.12 Diesel Generator Cooling Water System*

In LRA Section 2.3.3.12, "Diesel Generator Cooling Water System," the applicant described the components of the diesel generator cooling water system that are within the scope of the license renewal and subject to an AMR. This system is described in Section 9.5.5 of the McGuire and Catawba UFSARs. The staff reviewed the LRA and the McGuire and Catawba UFSARs to determine whether the applicant adequately demonstrated that the requirements of 10 CFR Part 54 had been met.

The LRA refers to the "diesel generator cooling water system" for McGuire and to the "diesel generator engine cooling water system" for Catawba. For simplificity, the system will be referred to as the "diesel generator cooling water system" for both McGuire and Catawba.

2.3.3.12.1 Technical Information in the Application

The diesel generator cooling water system maintains the temperature of each emergency diesel generator engine and its support systems within a required operating range.

The applicant described the process for identifying the SSCs within the scope of license renewal in Section 2.1.1 of the LRA. Using that scoping methodology, the applicant determined that the diesel generator cooling water system was within the scope of license renewal and listed it on page 2.2-3 in Table 2.2-1 for McGuire and page 2.2-7 in Table 2.2-2 for Catawba. The LRA included system drawings that were highlighted to indicate the license renewal evaluation boundary.

The applicant described the process for identifying the SCs subject to an AMR in Section 2.1.2 of the LRA. Using that screening methodology, the applicant listed the mechanical components that are subject to an AMR in Tables 3.3-15 and 3.3-16 of the LRA for McGuire and Catawba, respectively. These tables also listed the intended functions of the components and the materials of construction. For McGuire, the applicant identified the following components of the diesel generator cooling water system as subject to an AMR—annubars, surge tanks, heat exchangers (tubes, tube sheet, channel head, and shell), turbocharger intercoolers (tubes, tube sheet, channel head, and shell), pump casings, heaters, flow orifices, piping, tubing, and valve bodies. For Catawba, the applicant identified the following components from the diesel

generator cooling water system as subject to an AMR—jacket water coolers (tubes, tube sheet, channel head, and shell), lube oil coolers (end covers, tubes, and shell), pump casings, standpipes, piping, tubing, and valve bodies. The applicant further identified the intended functions of these component types to be maintaining the integrity of the diesel generator cooling water system pressure boundary and transferring heat.

2.3.3.12.2 Staff Evaluation

The staff reviewed Section 2.3.3.12 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the diesel generator cooling water system that are within the scope of license renewal in accordance with 10 CFR 54.4 and that the applicant appropriately identified the mechanical components that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and applicable drawings submitted by the applicant in Section 2.3.3.12 of the LRA to verify that the applicant adequately identified the portions of the diesel generator cooling water system that meet the scoping of requirements of 10 CFR 54.4 and that these portions were included within the scope of license renewal in Section 2.3.3.12 of the LRA. The staff focused its review on those portions of the diesel generator cooling water system that were not identified as within the scope of license renewal to verify that they did not meet the scoping requirements of 10 CFR 54.4. The staff did not identify any omissions.

The staff reviewed Tables 3.3-15 and 3.3-16 of the LRA, which list the mechanical components subject to an AMR for the diesel generator cooling water systems for McGuire and Catawba. The staff verified that the applicant properly identified the mechanical components that were subject to an AMR from among those portions of the diesel generator cooling water system that were identified as within the scope of license renewal. The staff sampled the components that the applicant determined to be within the scope of license renewal, but not subject to an AMR, to verify that no component that performs its intended function(s) without moving parts or without a change in configuration or properties, and that is not subject to replacement based on qualified life or specified time period, was excluded from Tables 3.3-15 and 3.3-16.

During its review of Section 2.3.3.12, the staff determined that additional information was needed to complete its review. According to the license renewal boundary highlighted on drawings MCFD-1609-01.00, MCFD-2609-01.00, MCFD-1609-01.01, and MCFD-2609-01.01, the turbocharger turbine cooling supply/return (e.g., heat exchanger tubes) and the flexible hose (located at coordinates K4) were identified by the applicant as within the scope of license renewal. These components were not identified as subject to an AMR and were not listed in Table 3.3-15. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.12-1, that the applicant provide the basis for not listing the turbocharger turbine cooling supply and return lines and the flexible hose in Table 3.3-15, since these components are passive and long-lived and have pressure boundary intended functions. In its response dated April 15, 2002, the applicant stated that the turbocharger turbine cooling heat exchanger tubes were included in the "piping" entry in Table 3.3-15 of the LRA. As for the flexible hose, the applicant stated that this hose is replaced during periodic maintenance. The applicant implied that the hose is replaced based on qualified life in accordance with 10 CFR 54.21(a)(1)(i) and is, therefore, not subject to an AMR. However, since this was not clearly stated in the RAI response, this issue was characterized as SER open item 2.3.3.12.2-1. In its response to this open item, dated October 28, 2002, the applicant confirmed that the flexible hose in the diesel generator cooling water system is

replaced on a qualified life every 6 years and, therefore, is not subject to an AMR. The staff agrees with this conclusion, therefore, open item 2.3.3.12.2-1 is closed.

According to the license renewal boundary highlighted on Catawba drawings CN-1609-1.0 and CN 2609-1.0, the turbocharger aftercoolers and engine jackets are within the scope of license renewal. The passive portions of these components (e.g., turbocharger housing, tubes) that have a pressure boundary function were not listed on Table 3.3-14 as components subject to an AMR. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.12-2, that the applicant provide the basis for excluding the passive components of the turbocharger aftercoolers and engine jackets from the lists of components subject to an AMR. In its response dated April 15, 2002, the applicant stated that, even though the diesel generators and their sub-components, such as the turbocharger aftercoolers and the engine jackets, are within the scope of license renewal, diesel generators, without subcomponent exceptions, are explicitly excluded from an AMR by 10 CFR 54.21(a)(1)(i). The staff found the applicant's response acceptable because, even though portions of the diesel generator turbocharger aftercoolers and engine jacket are passive, these components are part of the diesel generator, which is active and not subject to an AMR in accordance with 10 CFR 54.21(a)(1)(i).

2.3.3.12.3 Conclusion

On the basis of its review of the information contained in Section 2.3.3.12 of the LRA, the supporting information from both UFSARs, applicable LRA drawings, and in the applicant's responses to RAIs and the SER open item, the staff concluded that there is reasonable assurance that the applicant has identified those portions of the diesel generator cooling water system that are within the scope of license renewal and those that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.13 Diesel Generator Crankcase Vacuum System*

In LRA Section 2.3.3.13, "Diesel Generator Crankcase Vacuum System," the applicant described the components of the diesel generator crankcase vacuum system that are within the scope of the license renewal and subject to an AMR. This system is further described in Section 9.5.9 of the McGuire UFSAR. This system is not described in the Catawba UFSAR. The staff reviewed the LRA and the UFSAR for McGuire to determine if the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

The LRA refers to the "diesel generator crankcase vacuum system" for McGuire, while the LRA refers to the "diesel generator engine crankcase vacuum system" for Catawba. For simplicity, the system will be referred to as the "diesel generator cooling water system" for both McGuire and Catawba.

2.3.3.13.1 Technical Information in the Application

The diesel generator crankcase vacuum system reduces the concentration of combustible gases in the crankcase. It also reduces oil leakage around inspection doors and explosion relief valves.

The applicant described the process for identifying the SSCs within the scope of license renewal in Section 2.1.1 of the LRA. Using that scoping methodology, the applicant determined that the

diesel generator crankcase vacuum system was within the scope of license renewal and listed it on page 2.2-3 in Table 2.2-1 for McGuire and page 2.2-7 in Table 2.2-2 for Catawba. The LRA included system drawings that were highlighted to indicate the license renewal evaluation boundary.

The applicant described the process for identifying the SCs subject to an AMR in Section 2.1.2 of the LRA. Using that screening methodology, the applicant listed the mechanical components that are subject to an AMR in Table 3.3-17 of the LRA for McGuire and Catawba. This table also listed the intended functions of the components and the materials of construction. The applicant identified the following components from the diesel generator crankcase vacuum system as subject to an AMR—blowers (McGuire only), oil separators (McGuire only), orifices (McGuire only), pipe, tubing (McGuire only), and valves bodies. The applicant further identified the intended function of these component types to be maintaining the integrity of the diesel generator crankcase vacuum system pressure boundary, filtration, gas removal, and throttling flow.

2.3.3.13.2 Staff Evaluation

The staff reviewed Section 2.3.3.13 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the portions of the diesel generator crankcase vacuum system that are within the scope of license renewal in accordance with 10 CFR 54.4, and that the applicant appropriately identified the mechanical components that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and applicable drawings submitted by the applicant in Section 2.3.3.13 of the LRA and the McGuire UFSAR, to verify that the applicant adequately identified the portions of the diesel generator crankcase vacuum system that are within the scope of license renewal, and that those portions were included within the scope of license renewal in Section 2.3.3.13 of the LRA. The staff focused its review on those portions of the diesel generator crankcase vacuum system that were not identified as within the scope of license renewal to verify that they did not meet the scoping requirements of 10 CFR 54.4. The staff did not identify any omissions.

The staff reviewed Table 3.3-17 of the LRA, which lists the mechanical components subject to an AMR for the diesel generator crankcase vacuum system for McGuire and Catawba. The staff verified that the applicant properly identified the mechanical components that were subject to an AMR from among those portions of the diesel generator crankcase vacuum system that were identified as within the scope of license renewal. The staff sampled the components that the applicant determined to be within the scope of license renewal ,but not subject to an AMR, to verify that no component that performs its intended functions without moving parts or without a change in configuration or properties, and that is not subject to replacement based on qualified life or specified time period, was excluded from an AMR.

During its review of Section 2.3.3.13, the staff determined that additional information was needed to complete its review. According to McGuire drawings MCFD-1609-06.00 and MCFD-2609-06.00, the two flexible hose connections on either side of the diesel generator crankcase vacuum blower are within the scope of license renewal. These flexible hose connections do not seem to be listed in LRA Table 3.3-17 as subject to an AMR. These components are within the scope of license renewal, are passive, and appear to have a pressure boundary function. By

letter dated January 28, 2002, the staff requested, in RAI 2.3.3.13-1, that the applicant provide the basis for excluding these flexible hose connections from the lists of components subject to an AMR. In its response dated April 15, 2002, the applicant stated that the parts identified by the staff as "flexible hose connections" are synthetic rubber flexible expansion joints, that they are replaced during the periodic maintenance on the diesel engine, and that they are not, therefore, considered long-lived components, and are not subject to an AMR. However, since the applicant did not provide information about the replacement of these flexible connectors (whether they are replaced on condition based on specific performance parameters or based on a qualified life), the staff is unable to evaluate the acceptability of this response. This issue was characterized as SER open item 2.3.3.13.2-1. In its response to this open item, dated October 28, 2002, the applicant stated that the synthetic rubber flexible hoses on the inlet and outlet of the diesel generator crankcase vacuum blowers are inspected for cracking and signs of wear on a 6-year frequency and replaced based on condition. The staff finds this to be an acceptable basis for excluding these hoses from an AMR, therefore, open item 2.3.3.13.2-1 is closed.

Catawba drawings CN-1609-6.0 and CN-2609-6.0 identify the portions of the diesel generator crankcase vacuum system that are within the scope of license renewal. These drawings do not show a blower. It is not apparent from these Catawba drawings how the system, without a blower, performs its intended function of reducing the concentration of combustible gases in the crankcase. The Catawba UFSAR does not provide any written description of the system. By letter dated January 28, 2002, the staff requested, in RAI 2.3.3.13-2, that the licensee provide an explanation on how the system performs its intended function. In its response dated April 15, 2002, the applicant stated that no blower exists in the diesel generator crankcase vacuum system at Catawba. During normal operation, the crankcase is ventilated by natural flow to the atmosphere through a vent pipe which penetrates the diesel building roof. Since the applicant confirmed that no component (blower) is relied upon to maintain a vacuum in the diesel generator crankcase, the staff found the applicant's response acceptable.

2.3.3.13.3 Conclusion

The staff reviewed the information contained in Section 2.3.3.13 of the LRA, the supporting information from the McGuire UFSAR, applicable LRA drawings, and the applicant's responses to RAIs and the SER open item. The staff concluded that there is reasonable assurance that the applicant has identified those portions of the diesel generator crankcase vacuum system that are within the scope of license renewal and those that are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

*2.3.3.14 Diesel Generator Fuel Oil System*

In LRA Section 2.3.3.14, "Diesel Generator Fuel Oil System," the applicant described the components of the diesel generator fuel oil system that are within the scope of the license renewal and subject to an AMR. This system is described in Section 9.5.4 of the McGuire and Catawba UFSARs. The staff reviewed the LRA and the UFSARs for McGuire and Catawba to determine if the applicant adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

The LRA refers to the "diesel generator fuel oil system" for McGuire and to the "diesel generator engine fuel oil system" for Catawba. For simplicity, the system will be referred to as the "diesel generator fuel oil system" for both McGuire and Catawba.