Application to Renew the Operating Licenses of McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2

Technical Information

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1.0 ADMINISTRATIVE INFORMATION

In compliance with 10 CFR §54.19(a) and (b), the following general information (derived from 10 CFR §50.33(a) through (e), (h), and (i)) is provided:

1.1 NAME OF APPLICANT

For McGuire Nuclear Station, Units 1 and 2, Duke Energy Corporation is the applicant.

For Catawba Unit 1, Duke Energy Corporation is the applicant and is authorized to act as agent for the North Carolina Electric Membership Corporation and the Saluda River Electric Cooperative, Inc., and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility (NPF-35, License Condition 1.E).

For Catawba Unit 2, Duke Energy Corporation is the applicant and is authorized to act as agent for the North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency, and has exclusive responsibility and control over the physical construction, operation, and maintenance of the facility (NPF-52, License Condition 1.E).

1.2 ADDRESS OF APPLICANT

Duke Energy Corporation
422 South Church Street
Charlotte, North Carolina 28202-1904

1.3 DESCRIPTION OF BUSINESS OF APPLICANT

Duke Energy Corporation (collectively with its subsidiaries, “Duke Energy”) is an integrated energy and energy services provider with the ability to offer physical delivery and management of both electricity and natural gas throughout the United States and abroad. Duke Energy provides these and other services through seven business segments.

Franchised Electric generates, transmits, distributes and sells electric energy in central and western North Carolina and the western portion of South Carolina. Electric operations are conducted primarily through Duke Power and Nantahala Power and Light. These electric operations are subject to the rules and regulations of the Federal Energy Regulatory Commission, the North Carolina Utilities Commission and the Public Service Commission of South Carolina.

Natural Gas Transmission provides interstate transportation and storage of natural gas for customers primarily in the Mid-Atlantic, New England and southeastern states. Gas operations are conducted primarily through Duke Energy Gas Transmission Corporation. The interstate natural gas transmission and storage operations are subject to the rules and regulations of the FERC.

Field Services gathers, processes, transports, markets and stores natural gas and produces, transports, markets and stores natural gas liquids. Gas operations are conducted primarily through Duke Energy Field Services, LLC, a limited liability company that is approximately 30% owned by Phillips Petroleum. Field Services operates gathering systems in western Canada and 11 contiguous states that serve major natural gas-producing regions in the Rocky Mountain, Permian Basin, Mid-Continent, East Texas-Austin Chalk-North Louisiana, as well as onshore and offshore Gulf Coast areas.

North American Wholesale Energy’s (NAWE’s) activities include asset development, operation and management, primarily through Duke Energy North America, LLC, and commodity sales and services related to natural gas and power, primarily through Duke Energy Trading and Marketing, LLC (DETM). DETM is a limited liability company that is approximately 40% owned by Exxon Mobil Corporation. NAWE also includes Duke Energy Merchants (DEM), which develops new business lines in the evolving energy commodity markets. NAWE conducts its business throughout the U.S. and Canada.

International Energy conducts its operations through Duke Energy International, LLC. International Energy’s activities include asset development, operation and management of natural gas and power facilities and energy trading and marketing of natural gas and electric power. This activity is targeted in the Latin American, Asia-Pacific and European regions.

Energy Services is a combination of businesses that provide engineering, consulting, construction and integrated energy solutions worldwide, primarily through Duke Engineering & Services, Inc., Duke/Fluor Daniel (D/FD) and DukeSolutions, Inc. D/FD is a 50/50 partnership between Duke Energy and Fluor Enterprises, Inc.

Duke Ventures is comprised of other diverse businesses, primarily operating through Crescent Resources, Inc. (Crescent), DukeNet Communications, LLC (DukeNet) and Duke Capital Partners (DCP). Crescent develops high-quality commercial, residential and multi-family real estate projects and manages land holdings primarily in the southeastern U.S. DukeNet provides fiber optic networks for industrial, commercial and residential customers. DCP, a newly formed, wholly owned merchant finance company, provides financing, investment banking and asset management services to wholesale and commercial energy markets.

1.4 LEGAL STATUS AND ORGANIZATION

Duke Energy Corporation is a public utility incorporated under the laws of the State of North Carolina. Duke's principal office is located in Charlotte, North Carolina at the address stated in Section 1.2 above. The principal location where Duke does business is North Carolina.

Duke Energy Corporation is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

Directors:

The names and business addresses of Duke Energy Corporation's directors and principal officers, all of whom are citizens of the United States, are as follows:

G. Alex Bernhardt, Sr.
Bernhardt Furniture Company
P.O. Box 740
Lenoir, North Carolina 28645

Robert J. Brown
B & C Associates, Inc.
P.O. Box 2636
High Point, North Carolina 27261

William A. Coley
Duke Energy Corporation
P.O. Box 1006, EC 3XD
Charlotte, North Carolina 28201-1006

William T. Esrey
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P.O. Box 11315
Kansas City, Missouri 64112

Ann Maynard Gray
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Stamford, Connecticut 06903

Dennis R. Hendrix
Duke Energy Corporation
P.O. Box 1642
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Harold S. Hook
American General Corporation/Wortham Tower
2727 Allen Parkway, Suite 1601
Houston, Texas 77019-2125

George Dean Johnson, Jr.
Extended Stay America
961 East Main Street
Spartanburg, South Carolina 29302

Dr. Max Lennon, President
Mars Hill College, Blackwell Hall
124 Cascade Street
Mars Hill, North Carolina 28754

Leo E. Linbeck, Jr.
Linbeck Corporation
P.O. Box 22500
Houston, Texas 77227

James G. Martin
Carolinas Healthcare System
P.O. Box 32861
Charlotte, North Carolina 28232

Richard B. Priory
Duke Energy Corporation
P.O. Box 1006, EC3XB
Charlotte, North Carolina 28201-1006

Principal Officers:

Richard W. Blackburn, Executive Vice President, General Counsel and Secretary
Duke Energy Corporation
P.O. Box 1006
Charlotte, North Carolina 28201-1006

Robert P. Brace, Executive Vice President and Chief Financial Officer
Duke Energy Corporation
P.O. Box 1006
Charlotte, North Carolina 28201-1006

William A. Coley,
Group President, Duke Power
Duke Energy Corporation
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Charlotte, North Carolina 28201-1006

Fred J. Fowler, Group President, Energy Transmission
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P.O. Box 1642
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P. O. Box 1244
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Sandra P. Meyer, Senior Vice President and Corporate Controller
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Charlotte, North Carolina 28201-1244

Richard J. Osborne, Executive Vice President and Chief Risk Officer
Duke Energy Corporation
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Charlotte, North Carolina 28201-1006

Harvey J. Padewer,
Group President, Energy Services
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Ruth G. Shaw, Executive Vice President and Chief Administrative Officer
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Charlotte, North Carolina 28201-1006

Richard B. Priory, Chairman of the Board, President and Chief Executive Officer
Duke Energy Corporation
P.O. Box 1006
Charlotte, North Carolina 28201-1006

Michael S. Tuckman, Executive Vice
President, Nuclear Generation
Duke Energy Corporation
P.O. Box 1006
Charlotte, North Carolina 28201-1006

1.5 CLASS AND PERIOD OF LICENSE SOUGHT

Duke requests renewal of the NRC Section 103 operating licenses for McGuire Nuclear Station, Units 1 and 2 (license numbers NPF-9 and NPF-17, respectively). For McGuire Unit 1 (NPF-9), renewal would revise the existing license expiration date from midnight June 12, 2021, until midnight June 12, 2041.

For McGuire Unit 2 (NPF-17), renewal would revise the existing license expiration date from midnight March 3, 2023, until either midnight March 3, 2043 or midnight 40 years from the date of the issuance of the renewed operating license for Unit 2, whichever is earlier.

Duke requests renewal of the NRC Section 103 operating licenses for Catawba Nuclear Station, Units 1 and 2 (license numbers NPF-35 and NPF-52, respectively). For Catawba Unit 1 (NPF-35), renewal would revise the existing license expiration date from midnight December 6, 2024, until either midnight December 6, 2044 or midnight 40 years from the date of the issuance of the renewed operating license for Unit 1, whichever is earlier.

For Catawba Unit 2 (NPF-52), renewal would revise the existing license expiration date from midnight February 24, 2026, until either midnight February 24, 2046 or midnight 40 years from the date of the issuance of the renewed operating license for Unit 2, whichever is earlier. The use to which both the McGuire and Catawba facilities will be put during the renewal period is the continued generation of electric power.

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.

This Application includes a request for renewal of those NRC source material, special nuclear material, and byproduct material licenses that are currently subsumed or combined with the current operating licenses.

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

This Application contains no Restricted Data or other defense information.

1.6 CONFORMING CHANGES TO STANDARD INDEMNITY AGREEMENT

10 CFR §54.19(b) requires that license renewal applications include "conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license."

The current indemnity agreement for 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.

1.7 REGULATORY AGENCIES WITH JURISDICTION

The North Carolina Utilities Commission and the Public Service Commission of South Carolina currently have jurisdiction over the rates and services provided by Duke's utility operations at McGuire and at Catawba. The addresses of these state commissions are as follows:

North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4325

Public Service Commission of
South Carolina
P.O. Drawer 1169
Columbia, South Carolina 29211

1.8 LOCAL NEWS PUBLICATIONS

The trade and news publications which circulate in the area surrounding McGuire Nuclear Station and Catawba Nuclear Station, and which are considered appropriate to give reasonable notice of the renewal application to those municipalities, private utilities, public bodies, and cooperatives that might have a potential interest in the facility, include the following:

The Charlotte Observer
600 South Tryon Street
Charlotte, North Carolina 28202

Lake Norman Times
Huntersville Times
147 East Center Avenue
Mooresville, North Carolina 28115

Lincoln Times News
P. O. Box 40
Lincolnton, North Carolina 28093-0040

Mt. Holly News
Belmont Banner
611 Central Avenue
Belmont, North Carolina 28012

Moorseville Tribune
Davidson Gazette
147 East Center Avenue
Moorseville, North Carolina 28115

Lake Wylie Magazine
P. O. Box 5181
Lake Wylie, South Carolina 29710

The Clover Herald
The Yorkville Inquirer
P. O. Box 38
Clover, South Carolina 29710

Fort Mill Times
P. O. Box 250
Fort Mill, South Carolina 29716-0250

The Herald
P. O. Box 11701
Rock Hill, South Carolina 29731

1.9 COMMUNICATIONS

All communications to the applicant pertaining to the Application to Renew the Operating Licenses of McGuire Nuclear Station and Catawba Nuclear Station should be sent to the following:

Addressee:
Michael S. Tuckman, Executive Vice President, Nuclear Generation
Duke Energy Corporation
Mail Stop EC 07H
P.O. Box 1006
Charlotte, North Carolina 28201-1006

Copies to:

Brew Baron
Site Vice President
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, North Carolina 28078-8985

Gary Petersen
Site Vice President
Catawba Nuclear Station
4800 Concord Road
York, South Carolina 29745-9635

Robert L. Gill, Jr.
Duke Energy Corporation
Mail Stop EC 12R
P.O. Box 1006
Charlotte, North Carolina 28201-1006

Gregory D. Robison
Duke Energy Corporation
Mail Stop EC 12R
P.O. Box 1006
Charlotte, North Carolina 28201-1006

North Carolina Municipal Power Agency Number 1
1427 Meadowwood Boulevard
P. O. Box 29513
Raleigh, North Carolina 27626

North Carolina Electric Membership Corporation
P. O. Box 27306
Raleigh, North Carolina 27611

Piedmont Municipal Power Agency
121 Village Drive
Greer, South Carolina 29651

Saluda River Electric Cooperative, Inc.
P. O. Box 929
Laurens, South Carolina 29360

In addition, it is requested that copies of correspondence related to the renewal of the McGuire and Catawba Operating Licenses be sent to Duke's Office of General Counsel and Washington, DC counsel as follows:

Lisa Vaughn, Esq.
Duke Energy Corporation
P. O. Box 1244
Mail Stop PB 05E
Charlotte, North Carolina 28201-1244

J. Michael McGarry, III, Esq.
Anne W. Cottingham, Esq.
Winston & Strawn
1400 L Street, NW
Washington, DC 20005

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

2.1 SCOPING AND SCREENING METHODOLOGY

Note: The Scoping and Screening Methodology described in Section 2.1 is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station.

The criteria that determine the systems, structures and components within the scope of license renewal are provided in 10 CFR Part 54, §54.4 [Reference 2.1-1]. Section 2.1.1 provides a description of the scoping methodology that has been implemented to address these criteria for both McGuire and Catawba. This methodology is consistent with the guidance provided in NEI 95-10 [Reference 2.1-2].

The criteria that determine which structures and components are subject to aging management review are provided in 10 CFR Part 54, §54.21(a)(1) [Reference 2.1-1]. Section 2.1.2 provides a description of the screening methodology that has been implemented to address these criteria for both McGuire and Catawba. This methodology is consistent with the guidance provided in NEI 95-10 [Reference 2.1-2].

2.1.1 SCOPING METHODOLOGY

As background and in contrast with mechanical and structural scoping, electrical scoping is not performed globally on all electrical systems or components. The scoping criteria are applied only to specific electrical systems and components in order to demonstrate that they are not within the scope of license renewal. Electrical systems and components for which there is no detailed scoping evaluation are within the scope of license renewal. The result of the electrical system and component scoping is a broad set of components that are included within the scope of license renewal, and only a few systems and components are excluded from further license renewal consideration. This limited scoping does not preclude performing a scoping evaluation for other electrical systems or components at any time to demonstrate that they are not within the scope of license renewal. The electrical scoping methodology, by including within scope a set of components larger than the set of components that actually meet the §54.4(a) criteria, is consistent with the requirements of §54.4 and §54.21(a)(1) and provides reasonable assurance that there has been no omission of electrical components that are within the scope of license renewal.

2.1.1.1 Safety Related Systems, Structures and Components

Systems, structures and components which are relied upon to remain functional during and following design bases events to ensure the functions specified in §54.4(a)(1), *Scope*, are within the scope of license renewal.

Provided below are the methodologies for identifying systems, structures and components that satisfy the scoping criteria in §54.4(a)(1).

§54.4 (a)(1)

(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 those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable.

<u> 10 CFR 50.49(b)(1)(ii)</u>*
Design basis events are defined as conditions of normal operation, including anticipated operational occurrences, design basis accidents, external events, and natural phenomena for which the plant must be designed to ensure functions (b)(1)(i) (A) through (C) of this section. [Essentially the same as functions (a)(1)(i) through (iii) above].

2.1.1.1.1 SAFETY RELATED MECHANICAL SYSTEMS

Guidance contained in Regulatory Guides 1.26 and 1.29 has been used to establish those McGuire and Catawba systems, structures and components that satisfy the scoping criteria in §54.4(a)(1).

Regulatory Guide (RG) 1.26, *Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants* [Reference 2.1-3] describes a method acceptable to the NRC for assigning quality classifications to safety-related components containing water, steam or radioactive material in water-cooled nuclear power plants. The classification system consists of four different quality groups (A through D), includes methods for assigning components to these quality groups, and describes specific quality standards applicable to each quality group. The applicability of the requirements in RG 1.26 is summarized in the McGuire UFSAR Section 1.7, *Division 1 Regulatory Guides*, and in the Catawba UFSAR Section 1.7, *Regulatory Guides*. The UFSARs state how the systems, structures and components meet the guidance contained in RG 1.26. Duke System Piping Classifications A, B and C and Duke QA Condition 1 are assigned to safety-related systems, structures and components. The basis for these safety classifications is consistent with the scoping criteria of Part 54. In addition, these three piping classifications correspond to NRC Quality Group A, B and C, and ANS Safety Class 1, 2 and 3, respectively.

Regulatory Guide (RG) 1.29, *Seismic Design Classification* [Reference 2.1-4] describes a method acceptable to the NRC for identifying and classifying those plant systems, structures and components, including their foundations and supports, that should be designed to withstand the effects of a safe shutdown earthquake and remain functional. These plant systems, structures and components are designated as Seismic Category I. The applicability of the requirements in RG 1.29 is summarized in the McGuire UFSAR Section 1.7, *Division 1 Regulatory Guides*, and in the Catawba UFSAR Section 1.7, *Regulatory Guides*. The UFSARs state how the systems, structures and components meet the guidance contained in RG 1.29. Quality Assurance (QA) requirements of QA Condition 1 are applied to plant systems, structures and components identified in Regulatory Positions C.1 and C.3 of RG 1.29, while the QA requirements of QA Condition 4 are applied (with noted clarifications) to those items specified in Regulatory Position C.2.

Plant mechanical systems and components are categorized by safety classification. Within a system, components or portions of systems may have different classifications. System piping classifications are shown on mechanical system flow diagrams. Categories A, B, C, E, F, G and H have been established by Duke for the classification of components. These categories are based on NRC-defined Quality Group Standards and ANS Safety Classes, and they reflect both safety-related and non safety-related classifications. Table 2.1-1 shows the relationship between Duke System Piping Classes, NRC Quality Groups and ANS Safety Classes. This information is consistent with the descriptions of the classification system given in Table 3-5 of the McGuire UFSAR and Table 3-5 of the Catawba UFSAR.

Table 2.1-1 Duke System Piping Classifications

Duke System Piping Class	Safety Related ?	NRC Quality Group	Duke QA Condition	ANS Safety Class	Code Design Criteria	Designed for Seismic Loading?
A	Yes	A	1	1	Class 1, ASME Section III	Yes - Cat. I
B	Yes	B	1	2	Class 2, ASME Section III	Yes - Cat. I
C	Yes	C	1	3	Class 3, ASME Section III	Yes - Cat. I
E	No	D	2*	NNS	ANSI B31.1.0	No
F	No	D	4	NNS	ANSI B31.1.0	Yes - Cat. II
G	No	-	-	-	ANSI B31.1.0	No
H	No	-	-	-	Duke Power Company Specification	No

* QA CONDITION 2 is applied to systems designed to normally carry a radioactive fluid; however, they are considered non-nuclear safety (NNS) systems, since a component failure would not result in a calculated potential exposure in excess of the limits established in 10 CFR 20.

Duke System Piping Classes A, B, and C are within the scope of license renewal because they satisfy the criteria of §54.4(a)(1). A detailed description of the Duke System Piping Classes A, B and C is given in Section 3.2.3 of the McGuire UFSAR and Section 3.2.2.3 of the Catawba UFSAR. Mechanical systems and components not classified as Duke Class A, B or C are nonsafety-related for both McGuire and Catawba.

The results of the review to identify McGuire and Catawba safety related mechanical systems are included with the results of the other scoping reviews. The composite list of systems within the scope of license renewal is provided in Section 2.2 of the Application.

2.1.1.1.2 SAFETY RELATED STRUCTURES

All structures at both McGuire Nuclear Station and Catawba Nuclear Station are classified according to their design function and the degree of structural integrity required to ensure the health and safety of the public. Appendix A to 10 CFR Part 100, *Seismic and Geologic Siting Criteria for Nuclear Power Plants* [Reference 2.1-5] requires that all nuclear power plants be designed so that, if a Safe Shutdown Earthquake occurs, certain structures, systems, and components remain functional. These structures, systems and components are those necessary to ensure:

(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 which could result in potential offsite exposures comparable to the guideline exposures in 10 CFR Part 100.

These 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. All safety-related structures are designated as Seismic Category I and are within the scope of license renewal. The classification of each structure has been previously determined and documented in the McGuire Nuclear Station and the Catawba Nuclear Station UFSARs. Category I structures are identified through a review of the plant UFSAR.

The results of the review to identify McGuire and Catawba safety-related structures are included with the results of the other scoping reviews. The composite list of structures within the scope of license renewal is provided in Section 2.2 of the Application.

2.1.1.1.3 SAFETY-RELATED ELECTRICAL SYSTEMS AND COMPONENTS
Electrical scoping was performed at the system and component level. Specific electrical systems and components were reviewed against the safety-related scoping criteria of §54.4(a)(1). Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet safety-related scoping criteria of §54.4(a)(1). Refer to Section 2.1.2.3.1 for passive electrical commodities. No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

2.1.1.2 Nonsafety-Related Systems, Structures and Components

All nonsafety-related systems, structures and components, whose failure could prevent satisfactory accomplishment of any of the functions identified in §54.4 (a)(1)(i), (ii), and (iii) are within the scope of license renewal.

§54.4 (a)(2)

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

Two types of systems, structures, and components must be considered for inclusion within the scope of license renewal per §54.4(a)(2):

1. Nonsafety-related systems and structures, and nonsafety-related portions of safety-related systems and structures, whose physical failure could damage equipment that is performing a safety function, and prevent it from performing that function. This includes:

    - Failure of structural supports such that piping and/or components might fall onto equipment that is performing a safety function, and prevent it from performing that function. In this case, only the structural supports are required to remain intact in order to ensure the safety function is fulfilled.

    - Fluid leakage from piping and/or components onto nearby equipment that is performing a safety function, and which could prevent it from performing that function. In this case, both the pressure boundary and structural integrity of the piping and/or components are of concern.

2. Nonsafety-related systems, structures and components whose failure could prevent satisfactory accomplishment of any of the functions identified in §54(a)(1)(i),(ii) and (iii).

Provided below are the methodologies for identifying mechanical systems, structures, and electrical systems and components that satisfy the scoping criterion in §54.4(a)(2).

2.1.1.2.1 NONSAFETY-RELATED MECHANICAL SYSTEMS

Duke System Piping Class F, also designated QA Condition 4, is the nonsafety-related piping assigned to those systems and components whose pressure boundary loss may adversely affect essential systems or equipment. These systems and components have therefore been designed for seismic loading.

Duke Class F applies to those portions of systems and components whose failure:

- could result in flooding of nuclear safety-related equipment, or

- could jeopardize nuclear safety-related piping or equipment during a safe shutdown earthquake.

Components and materials classified as Duke Class F also meet the code and standard requirements of NRC Quality Group D. Mechanical systems containing Class F piping and/or components are within the scope of license renewal.

QA Condition 4 has also been applied to nonsafety-related portions of piping and HVAC duct systems that must be seismically-qualified to preclude adversely impacting the function of safety-related equipment during a safe shutdown earthquake. In this situation, only the structural supports are required to remain intact in order to ensure the safety function is fulfilled.

In addition, a review of design and licensing basis documentation indicates that some additional nonsafety-related mechanical systems, which would be designated as Duke Class E, G, or H, may be relied upon to remain functional during and following design basis events. These nonsafety-related systems are also included in the scope of license renewal.

2.1.1.2.2 NONSAFETY-RELATED STRUCTURES

Structures whose continued function is not required, but whose failure could impair the function of safety-related SSCs, or could injure control room occupants, are designated as Duke Power Seismic Category II in accordance with Regulatory Guide 1.29 Position C.2. They are nonsafety-related, but are designed to prevent detrimental effects to safety-related SSCs or injury to control room occupants. Category II structures meet the intent of §54.4(a)(2) and are within the scope of license renewal.

Structures at McGuire and Catawba that are not identified as either Category I or II are classified as Category III structures. Category III structures are those whose functions are not related to nuclear safety and whose collapse under earthquake loading will not impair the integrity of Seismic Category I or II items. Category III structures are not within the scope of license renewal unless they are determined to meet the criteria of §54.4(a)(3).
The classification of each structure has been previously determined and documented in the McGuire UFSAR and the Catawba UFSAR. Category II structures are identified through a review of the plant UFSAR.

2.1.1.2.3 NONSAFETY RELATED ELECTRICAL SYSTEMS AND COMPONENTS

Electrical scoping was performed at the system and component level. Specific electrical systems and components were reviewed against the nonsafety-related scoping criterion of §54.4(a)(2). Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet nonsafety-related scoping criterion of §54.4(a)(2). Refer to Section 2.1.2.3.1 for passive electrical commodities. No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

2.1.1.3 Regulated Events

In addition to those systems, structures and components relied upon to mitigate design basis events (§54.4(a)(1)), or whose failure could prevent mitigation of design basis events (§54.4(a)(2)), the systems and plant structures previously committed to support certain specific NRC regulations must be identified for license renewal. The methodology for identifying the systems and structures that are required to demonstrate compliance with each of these regulations is provided in this section.

Part 54 defines the scoping requirements for these specific regulations as follows:

10 CFR 54.4(a)(3)

> *(a) Plant systems, structures, and components within the scope of this part are--*
>
> *[...]*
>
> *(3) All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).*

The systems, structures and components required to demonstrate compliance with the specific regulations identified in §54.4(a)(3) were determined through an extensive review of licensing correspondence files, safety evaluation reports, the UFSAR, and other appropriate design documents for each station. The following sections include discussions of the regulated events and the results of the review.

2.1.1.3.1 FIRE PROTECTION

Systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with §50.48, *Fire protection*, are within the scope of license renewal.

§50.48 (b)

> *Appendix R to this part establishes fire protection features required to satisfy Criterion 3 of Appendix A to this part with respect to certain generic issues licensed to operate prior to January 1, 1979. Except for the requirements of Sections III.G, III.J, and III.O, the provision of Appendix R to this part shall not be applicable to nuclear power plants licensed to operate prior to January 1, 1979, to the extent that fire protection features proposed or implemented by the licensee have been accepted by the NRC staff as satisfying the provisions of Appendix A to Branch Technical Position BTP APCSB 9.5-1 reflected in staff fire protection safety evaluation reports issued prior to the effective date of this rule, or to the extent that fire protection features were accepted by the staff in comprehensive fire protection safety evaluation reports issued before Appendix A to Branch Technical Position BTP APCSB 9.5-1 was published in August 1976.*

Note: The licensing basis with regard to fire protection differs at McGuire and Catawba. The following paragraphs discuss the fire protection systems at each station.

McGuire is licensed to 10 CFR §50.48 (b) as specifically stated in Safety Evaluation Reports and Facility Operating License. The McGuire fire protection system is designed to provide automatic and manual means to control and extinguish fires that may occur within building, yard, and transformer areas. The fire protection program at McGuire is based upon an evaluation of potential fire hazards throughout the Auxiliary and Reactor Buildings and areas adjacent to these facilities. This evaluation demonstrates that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire. The NRC Safety Evaluation Report for McGuire, NUREG-0422 [Reference 2.1-6], provides the staff evaluation of the McGuire response to BTP APCSB 9.5-1 and modifications to comply with BTP APCSB 9.5-1. The following license conditions apply for McGuire Nuclear Station: 2.C.(3) for Unit 1 and 2.C.(7) for Unit 2.

Catawba is licensed to 10 CFR §50.48 (b) as specifically stated in Safety Evaluation Reports and Facility Operating License. The Catawba fire protection system is designed to provide automatic and manual means to control and extinguish fires that may occur within building, yard and transformer areas. The fire protection program at Catawba Nuclear Station is based upon an evaluation of potential fire hazards throughout the Auxiliary, Diesel Generator and Reactor Buildings, and Nuclear Service Water Pump Structure, and those portions of the Turbine and Service Buildings adjacent to these facilities. This evaluation demonstrates that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire. The NRC Safety Evaluation Report for Catawba, NUREG-0954 [Reference 2.1-7], provides the staff evaluation of the Catawba response to the applicable fire protection requirements. The following license conditions apply for Catawba Nuclear Station: 2.C.(8) for Unit 1 and 2.C.(6) for Unit 2.

As part of the response to Appendix A to BTP APCSB 9.5-1 [Reference 2.1-8], Duke committed to install a dedicated standby shutdown system (SSS) at each station that uses some existing plant safety-related systems, as well as certain equipment that would be used only in the event of a fire or plant security emergency. The purpose of the SSS during such events is to bring the plant to a hot standby condition and maintain the hot standby mode for up to 3 days without recourse to damage control measures. The capability to achieve and maintain hot standby conditions utilizing the SSS is assured in most fire areas by virtue of location of SSS-required equipment and cabling outside the fire area and breaker coordination on non-required SSS loads. In cases where the SSS is unavailable because of the fire, normal shutdown capability would be available.

Each station uses a quality condition designation, Duke QA Condition 3, that applies uniquely to fire protection systems, structures, components, and services. Systems designated as QA Condition 3 are those systems that promptly detect, control and extinguish fires to limit their damage and provide protection for systems, structures, components, and services so that a fire will not prevent the safe shutdown of the plant.

The results of the review to Identify McGuire and Catawba mechanical systems and structures that are relied upon to demonstrate compliance with §50.48 are included with the results of the other scoping reviews. The composite list of mechanical systems and structures within the scope of license renewal is provided in Section 2.2 of this Application.

Electrical scoping was performed at the system and component level. Specific electrical systems and components were reviewed against the fire protection regulated event scoping criterion of §54.4(a)(3). Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet the fire protection regulated event scoping criterion of §54.4(a)(3). No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

2.1.1.3.2 ENVIRONMENTAL QUALIFICATION

Systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with §50.49, *Environmental qualification of electric equipment important to safety for nuclear power plants*, are within the scope of license renewal.

§50.49

(a) Each holder of or an applicant for a license for a nuclear power plant, other than a nuclear power plant for which the certification required under §50.82(a)(1) have been submitted, shall establish a program for qualifying the electric equipment defined in paragraph (b) of this section.

(b) Electric equipment important to safety covered by this section is:

(1) Safety-related electric equipment…

(2) Non-safety-related electric equipment…

(3) Certain post-accident monitoring equipment…

The Environmental Qualification master list identifying environmentally qualified electrical equipment is used to scope electrical components for this criterion.

The results of the review to identify McGuire and Catawba mechanical systems, containing mechanical components associated with electrical components that are relied upon to demonstrate compliance with §50.49, are included with the results of the other scoping reviews. The composite list of mechanical systems within the scope of license renewal is provided in Section 2.2. of this Application. No structures are relied upon to demonstrate compliance with §50.49.

Electrical scoping was performed at the system and component level. Specific electrical systems and components were reviewed against the environmental qualification regulated event scoping criterion of §54.4(a)(3). Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet the environmental qualification regulated event scoping criterion of §54.4(a)(3). No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

2.1.1.3.3 PRESSURIZED THERMAL SHOCK

Systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with §50.61, *Fracture toughness requirements for protection against pressurized thermal shock events,* are within the scope of license renewal.

§50.61(a)(2)

> *Pressurized Thermal Shock Event means an event or transient in pressurized water reactors (PWRs) causing severe overcooling (thermal shock) concurrent with or followed by significant pressure in the reactor vessel.*

Pressurized thermal shock has also been identified as a time-limited aging analysis (TLAA) for both McGuire Nuclear Station and Catawba Nuclear Station. The discussion of TLAA is provided in Chapter 4 of the Application. As discussed in Section 4.2.2 of the Application, the screening criteria contained in §50.61 will not be exceeded during the 20-year period of extended operation for any one of the McGuire or Catawba reactor vessels.

The reactor vessels are the only components required to demonstrate compliance with 10 CFR 50.61.

Pressurized thermal shock is a phenomenon limited to the Reactor Coolant System and the reactor vessel and does not directly involve any structures or structural components. Therefore, no structures are required to demonstrate compliance with §50.61. Likewise, no electrical systems or components are required to demonstrate compliance with §50.61.

The results of the review to identify McGuire and Catawba mechanical systems that are relied upon to demonstrate compliance with §50.61 are included with the results of the other scoping reviews. The composite list of systems within the scope of license renewal is provided in Section 2.2 of this Application.

2.1.1.3.4 ANTICIPATED TRANSIENTS WITHOUT SCRAM

Systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with §50.62, *Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water cooled nuclear power plants*, are within the scope of license renewal.

§50.62 (b)

> *Anticipated Transient Without Scram (ATWS) means an anticipated operational occurrence as defined in Appendix A of this part followed by the failure of the reactor trip portion of the protection system specified in General Design Criterion 20 of Appendix A of this part.*

§50.62 (c)(1)

> *Each pressurized water reactor must have equipment from sensor output to final actuation device, that is diverse from the reactor trip system, to automatically initiate the auxiliary (or emergency) feedwater system and initiate a turbine trip under conditions indicative of an ATWS. This equipment must be designed to perform its function in a reliable manner and be independent (from sensor output to the final actuation device) from the existing reactor trip system.*

To satisfy the regulatory requirements in §50.62, ATWS Mitigation System Actuation Circuitry (AMSAC) systems were installed at McGuire Nuclear Station and Catawba Nuclear Station. The design of these AMSAC systems is consistent with the generic design proposed by the Westinghouse Owners Group and is based on conditions that indicate a loss of main feedwater event, which if accompanied by a failure of the Reactor Protection System to SCRAM, the reactor leads to overpressurization of the Reactor Coolant System.

AMSAC actuation will occur if both main feedwater pumps trip or when main feedwater flow to the steam generators (3 out of 4 logic) is blocked due to valve closure in the feedwater lines. When an actuation occurs, the AMSAC circuitry will perform the following:

- Trip the main turbine,
- Start both motor-driven, auxiliary feedwater pumps, and
- Close the steam generator blowdown and sampling valves.

Electrical scoping was performed at the system and component level. Specific electrical systems and components were reviewed against the anticipated transients without SCRAM regulated event scoping criterion of §54.4(a)(3). Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet the anticipated transients without SCRAM regulated event scoping criterion of §54.4(a)(3). No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

The results of the review to identify McGuire and Catawba mechanical system components that either provide input to or are actuated by the AMSAC system are included with the results of the other scoping reviews. The composite list of systems within the scope of license renewal is provided in Section 2.2 of the Application. No structures are relied upon to demonstrate compliance with §50.62.

2.1.1.3.5 STATION BLACKOUT

Systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with §50.63, *Loss of all alternating current power*, are within the scope of license renewal.

§50.63 (a)(1)

> *Each light-water cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout as defined in §50.2. The specified station blackout duration shall be based on the following factors:*
>
> *(i) The redundancy of the onsite emergency ac power sources;*
>
> *(ii) The reliability of the onsite emergency ac power sources;*
>
> *(iii) The expected frequency of loss of offsite power; and*
>
> *(iv) The probable time needed to restore offsite power.*

McGuire Nuclear Station is a four (4) hour coping duration plant. The station utilizes an alternate AC power source as the method of coping with the station blackout. The alternate AC source is the Standby Shutdown Facility diesel. The equipment that would be used to achieve a safe shutdown condition is the equipment associated with the Standby Shutdown System.

Likewise, Catawba Nuclear Station is a four (4) hour coping duration plant. The station utilizes an alternate AC power source as the method of coping with the station blackout. The alternate AC source is the Standby Shutdown Facility diesel. The equipment that would be used to achieve a safe shutdown condition is the equipment associated with the Standby Shutdown System.

For both McGuire and Catawba, certain structures are relied upon to demonstrate compliance with §50.63. Certain areas containing safe shutdown equipment may heat up due to a loss of ventilation and cooling. Heatup calculations that were performed as a part of the station blackout review take credit for walls and ceilings of structures housing this safe shutdown equipment as a heat sink. The structures that contain these walls and ceilings are within the scope of license renewal.

Electrical scoping was performed at the system and component level. Specific electrical systems and components were reviewed against the station blackout regulated event scoping criterion of §54.4(a)(3). Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet the station blackout regulated event scoping criterion of §54.4(a)(3). No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

The results of the review to identify McGuire and Catawba mechanical systems and structures that are relied upon to demonstrate compliance with §50.63 are included with the results of the other scoping reviews. The composite list of systems and structures within the scope of license renewal is provided in Section 2.2 of the Application.

2.1.2 SCREENING METHODOLOGY

The identification of those structures and components that are subject to an aging management review is defined as screening. The criteria that determine the structures and components subject to aging management review for license renewal are provided in §54.21(a)(1).

§54.21(a)
(1) For those systems, structures and, components within the scope of this part, as delineated in §54.4, identify and list those structures and components subject to an aging management review. Structures and components subject to an aging management review shall encompass those structures and components –

(i) That perform an intended function, as described in §54.4, without moving parts or without a change in configuration or properties…; and

(ii) That are not subject to replacement based on a qualified life or specified time period.

NEI 95-10 [Reference 2.1-2] contains guidance that has been used for determining structures and components subject to an aging management review in this Application. Areas of NEI 95-10 that have been specifically used in this Application are Section 4.1.2, "Determining Structures and Components Subject to Aging Management Review and Their Intended Functions," and Appendix B, "Typical Structure, Component, and Commodity Groupings and Active/Passive Determinations for the Integrated Plant Assessment." The following sections provide additional descriptions of the screening methodologies used to identify the mechanical, structural and electrical components that are subject to an aging management reviews for McGuire Nuclear Station and Catawba Nuclear Station.

2.1.2.1 Screening Methodology for Mechanical Components

Section 2.1.2.1 provides the methodology to determine the mechanical components subject to an aging management review in accordance with the requirements of §54.21(a)(1). This component screening methodology for McGuire and Catawba involves the following steps:

1. Establishment of the license renewal evaluation boundaries.

2. Identification of mechanical components subject to aging management review.

3. Identification of the intended function(s) of each mechanical component.

These activities are discussed further in the following sections.

2.1.2.1.1 ESTABLISHMENT OF LICENSE RENEWAL SYSTEM EVALUATION BOUNDARIES

The result of implementing the methodology described in this section is a set of highlighted system flow diagrams for each plant establishing the license renewal evaluation boundaries corresponding to the scoping criteria of 10 CFR 54.4(a). The mechanical components found within the highlighted portions of these flow diagrams comprise the complete set of mechanical components within the scope of license renewal.

The evaluation boundaries are defined by marking system flow diagrams in accordance with the following guidelines:

Safety Related Boundaries

By definition, Duke Piping Class A, B, and C portions of a system are intended to perform safety-related functions to ensure that the criteria of §54.4(a)(1)(i)-(iii) are met. All flowpaths designated as Duke Piping Class A, B, or C, as identified by the Design Parameters table on the system flow diagrams, are highlighted.

Duke Piping Class A, B, and C do not apply to ventilation systems. Safety-related ventilation systems are identified as QA Condition 1, as indicated on system flow diagrams. For McGuire, the flow diagrams contain triangular flags that contain the number "1" to designate flowpaths or components as QA Condition 1. For Catawba, a review of system design basis specifications and applicable portions of the UFSAR is used to identify the safety-related flowpaths or components of each ventilation system. The QA Condition 1 flowpaths or components of ventilation systems are highlighted.

Non-Safety Related Boundaries

Duke System Piping Class F is the non safety-related piping classification for piping and components whose pressure boundary loss may adversely affect safety-related systems and components due to physical interactions. All Class F piping and components meet the criteria of §54.4(a)(2). All flowpaths designated as Duke Piping Class F, as identified by the Design Parameters table on the system flow diagrams, are highlighted.

A review of design and licensing documents indicates that some nonsafety-related components' functional failure may prevent a safety-related function from being performed. These flowpaths are not designated as Duke Piping Class A, B, C, or F. The flowpaths associated with these functions are highlighted.

Regulated Event Boundaries

Fire Protection

The following three aspects of plant design and documentation define the flowpaths and components that establish compliance with §50.48 and thus the evaluation boundaries to meet the fire protection criteria of §54.4(a)(3):

(1) Quality designation QA Condition 3 applies uniquely to fire protection systems, components, and services. Flow diagrams indicate with a note those flowpaths required to comply the with QA Condition 3 program. Those flowpaths and components designated on flow diagrams as QA Condition 3 are highlighted.

(2) As part of the response to Branch Technical Position APCSB 9.5-1, McGuire and Catawba provided a dedicated standby shutdown system to provide an alternate and independent means of achieving and maintaining a hot standby condition for one or both units following a postulated fire, sabotage, or station blackout event. For McGuire, the flow diagrams contain triangular flags that contain the letter “S” to designate flowpaths as part of the standby shutdown system. For Catawba, a review of applicable design and licensing documents related to the fire protection program provide information regarding flowpaths designated as part of the standby shutdown system. Those flowpaths designated as part of the standby shutdown system are highlighted.

(3) Components required to reach cold shutdown are required to establish compliance with §50.48 and thus the evaluation boundaries for the fire protection criteria of §54.4(a)(3). A review of applicable design and licensing documents provide information regarding functions required for cold shutdown. The flowpaths associated with these functions are highlighted.

Environmental Qualification

Environmental Qualification is only applicable at the component level. The Environmental Qualification equipment list established for 10 CFR 50.49(d) meets the environmental qualification criteria of §54.4(a)(3). Using this established equipment list, Environmental Qualification-related electrical components associated with mechanical components are included in the evaluation boundaries and are highlighted.

Pressurized Thermal Shock

The reactor vessels, components of the Reactor Coolant System, are the only components required to demonstrate compliance with 10 CFR 50.61, as described in Section 2.1.1.3.3 of this Application. The evaluation boundaries for pressurized thermal shock are bounded by the established safety-related boundaries.

Anticipated Transients without Scram

The Anticipated Transients without Scram (ATWS) Mitigation System Actuation Circuitry (AMSAC) electrical system was installed at McGuire and Catawba to meet the requirements of 10 CFR 50.62. A review of applicable design and licensing documents provide information regarding mechanical components that either provide input to or are actuated by the AMSAC system. These flowpaths or components are highlighted.

Station Blackout

McGuire and Catawba both take credit for the Standby Shutdown Facility diesel generator as an alternate AC source for coping with a station blackout event, and for the standby shutdown system-related equipment to achieve and maintain a hot standby condition for one or both units following the station blackout. As a result, the regulated event boundaries for station blackout are coincident with or bounded by those established for the safe shutdown portion of Fire Protection.

2.1.2.1.2 IDENTIFICATION OF COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

A menu that lists all passive, long-lived mechanical components and component groupings that are subject to an aging management review was developed for each plant. This menu was developed using plant system flow diagrams, equipment databases, and the guidance contained in NEI 95-10, Appendix B. The components within the marked areas of the flow diagrams are compared to the menu to determine the components that are subject to aging management review.

All instruments are exempt from an aging management review because they perform their function(s) with moving parts and/or a change of configuration or properties except for those mechanical indicating devices and electrical components that form an integral part of the pressure boundary. The pressure boundary of mechanical indicating devices and electrical components such as level glasses, flow glasses, in-line flow switches, elements, resistance temperature detectors (RTDs), sensors, thermocouples and transducers are subject to aging management review.

In addition, the definition of cooling fans includes ventilation fans, exhaust fans, purge fans, and blowers, and the definition of ventilation dampers is expanded to include ventilation louvers because the functions of these components are performed with moving parts.

Filter mediums such as paper filters, charcoal filters, and resins are within the scope of license renewal, but are replaced on condition and are not subject to aging management review. 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; therefore, an aging management review is not required.

Portable equipment is within the scope of license renewal but is not subject to aging management review because it is replaced on condition. Such equipment is routinely inspected for degradation. For example, fire extinguishers, self-contained breathing air packs, fire hoses and portable ductwork, credited for compliance with the Fire Protection rule, are inspected in accordance with National Fire Protection Association (NFPA) standards. These standards require replacement of portable equipment based on their condition or performance during testing and inspection. These portable components are not long-lived and are subject to replacement per NFPA standards, therefore an aging management review is not required.

2.1.2.1.3 IDENTIFICATION OF THE INTENDED FUNCTION(S) OF EACH SUBJECT COMPONENT

As described in NEI 95-10, the intended functions define the plant process, condition, or action that must be accomplished in order to perform or support a safety function for responding to a design basis event or to perform or support a specific requirement of one of the five regulated events in §54.4(a)(3). At a system level, the intended functions may be thought of as the functions of the system that are the bases for including this system within the scope of license renewal as specified in §54.4(a)(1)-(3). For the purposes of component screening and aging management review, a component intended function is defined as a function performed by a component in support of an intended function. The component intended functions of a subject component include only those functions that are required to enable the system to perform its intended function(s). A single component may provide multiple intended functions.

2.1.2.1.4 FLOW DIAGRAM HIGHLIGHTING AND COMPONENT IDENTIFICATION CONVENTIONS

The following items define the specific flow diagram highlighting conventions and are provided as an aid to the reviewer:

- For vents, drains, sample and test connections, the line is marked at the outlet of the isolation valve.

- All instrument lines normally open to the process system, through and including the instrument itself, are included within the scope of license renewal. These lines, however, are not marked, except for Containment penetrations.

- When the in-scope portion of the system is continued on a flow diagram for another system, the evaluation boundary includes the system boundary valve for the interfacing system.

- When the system boundary is not a physical boundary, the evaluation boundary extends to include the first physical boundary (closeable valve(s)) in the interfacing system.

- Each heat exchanger within the marked evaluation boundaries is evaluated with the system in its component tag number.

2.1.2.1.5 RESULTS

The tables contained in Sections 3.1, 3.2, 3.3, and 3.4 of this Application list all mechanical components that are subject to aging management review along with their intended functions.

2.1.2.2 Screening Methodology for Structural Components

Section 2.1.2.2 provides the methodology to determine the structural components subject to an aging management review in accordance with the requirements of §54.21(a)(1) of the license renewal rule. This component screening methodology for McGuire and Catawba involves 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 aging management review.

Following the identification of structures within the scope of license renewal, the structural components within each of the structures are identified. A generic list of structural components was developed by using the lists of components provided in NUMARC Containment and Class I Structures Industry Reports and Appendix B of NEI 95-10, [References 2.1-9, 2.1-10, and 2.1-2 respectively]. Additional components were added following the review of commitments made for compliance with the following regulated events: fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram and station blackout. Finally, several McGuire specific and Catawba specific documents were reviewed to determine any other structural components not previously identified. The components for each structure were identified using this generic list.

The functions of the structures were determined from a review of information contained in the plant specific UFSARs, plant specific engineering specifications, and plant specific regulated events documentation. The functions of structural components were determined from a review of the commitments made in response to design basis events and regulated events.

The structural component function(s) may support the intended function(s) of the structure or may have a unique function that does not support the intended function of the structure. A case in point is the spent fuel storage racks that are located in the Auxiliary Building. A unique function of the spent fuel storage racks is to maintain separation of the fuel assemblies to prevent criticality, which is not considered to be an intended function of the Auxiliary Building itself.

Structural steel, anchor bolts, base plates, etc. that are required to support nonsafety-related components to prevent physical interaction with safety-related equipment are subject to aging management reviews. These components must remain in place such that they do not impact equipment that is required to perform a safety function in such a way as to prevent the equipment from performing its safety function. This interaction is commonly referred to as Category II over Category I and is addressed in Regulatory Guide 1.29, Position C.2. [Reference 2.1-4] Components that address Position C.2 are identified as Duke QA Condition 4 and are within the scope of license renewal.

Architectural and structural features such as stairs, building siding, panels, platforms, and grating that do not perform a license renewal intended function are not subject to an aging management review.

Materials such as caulking and waterstops are not identified as structures or components. However, limited situations may exist where these materials are important to maintaining the integrity of the components to which they are connected. The license renewal structure or component intended functions supported by these materials are limited to two functions. These functions are:

(1) Providing a rated fire barrier.
(2) Providing a flood barrier.

Sealants and caulking that support the fire barrier function are addressed as part of the fire barrier penetration seals. Caulking and waterstops that support the flood barrier function are addressed with the wall or floor within which the sealant/waterstop is contained. Flood seals are identified as components and are addresed with the Auxiliary Building. Seals associated with maintaining pressure boundary are limited to the divider barrier seals in the Reactor Building.

Consistent with the guidance provided in NEI 95-10, structures and structural components within the scope of license renewal are long-lived and passive; therefore they require an aging management review. The tables contained in Section 3.5 of this Application list structural components that are subject to aging management review along with their intended functions.

2.1.2.3 Screening Methodology for Electrical Components

Section 2.1.2.3 provides the methodology of applying the passive and long-lived criteria of §54.21(a)(1) to electrical components. The electrical component integrated plant assessment is a commodity review and the electrical and instrumentation and control (I&C) commodity groupings are identified in Appendix B of NEI 95-10 [Reference 2.1-2]. The electrical screening methodology involves passive screening and long-lived screening that are discussed in the following sections.

2.1.2.3.1 PASSIVE SCREENING

NEI 95-10, Appendix B identifies the passive electrical and I&C commodity groupings (components that perform an intended function without moving parts or without a change in configuration) which are shown in Table 2.1-2 below. Other electrical and I&C commodities are active.

Table 2.1-2 Identification of Passive Electrical and I&C Commodities

Passive Electrical and I&C Commodities
Electrical portions of electrical and I&C penetration assemblies
High-voltage insulators
Insulated cables and connections (power, instrumentation and control applications; connections include plug-in connectors, splices and terminal blocks)
Phase bus (e.g., isolated-phase bus, nonsegregated-phase bus, bus duct)
Switchyard bus
Transmission conductors
Uninsulated ground conductors

Electrical and I&C commodities that may have a function to maintain pressure boundary (elements, resistance temperature detectors [RTDs], sensors, thermocouples, transducers, and heaters) are electrically active and would be subject to an aging management review only for the pressure boundary function. Components performing a pressure boundary function are included in the mechanical component screening process (See Section 2.1.2.1).

2.1.2.3.2 LONG-LIVED SCREENING

Electrical components included in the McGuire and Catawba *Environmental Qualification Program* (per 10 CFR 50.49) are replaced based on a qualified life, do not meet the criterion of §54.21(a)(1)(ii) and are not subject to an aging management review.

Some insulated cables and connections are included in the McGuire and Catawba *Environmental Qualification Program*. Insulated cables and connections included in the McGuire and Catawba *Environmental Qualification Program* do not meet this long-lived screening criterion and are not subject to an aging management review.

All electrical and I&C penetration assemblies are included in the McGuire and Catawba *Environmental Qualification Program*. None of the electrical and I&C penetration assemblies meet this long-lived screening criterion and none are subject to an aging management review. The portion of the penetrations which support the essentially leak-tight barrier of Containment are subject to an aging management review and are included with Reactor Building structural components.

No other electrical components are screened out per this long-lived screening criterion. The result is that the remainder of the integrated plant assessment involves only non-EQ electrical and I&C components.

2.1.3 REFERENCES FOR SECTION 2.1

2.1-1. Code of Federal Regulations, Title 10, Part 54, *Requirements for Renewal of Operating Licenses for Nuclear Power Plants*, 60 FR 22461, May 8, 1995.

2.1-2. *NEI 95-10*, *Revision 2*, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule,* Nuclear Energy Institute, August 2000.

2.1-3. Regulatory Guide (RG) 1.26, *Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants.*

2.1-4. Regulatory Guide (RG) 1.29, *Seismic Design Classification.*

2.1-5. Code of Federal Regulations, Title 10, Part 100, *Reactor Site Criteria.*

2.1-6. NUREG-0422, *Safety Evaluation Report Related to the Operation of the McGuire Nuclear Station, Units 1 and 2*, March 1978, as supplemented, Docket Nos. 50-369 and 50-370.

2.1-7. NUREG-0954, *Safety Evaluation Report Related to the Operation of the Catawba Nuclear Station, Units 1 and 2,* February 1983, as supplemented, Docket Nos. 50-413 and 50-414.

2.1-8. BTP APCSB 9.5-1 Appendix A, Branch Technical Position, *Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976,* August 1976.

2.1-9. *Pressurized Water Reactor Containment Structures License Renewal Industry Report*, NUMARC Report Number 90-01, Nuclear Management and Resources Council, Revision 1, September 1991.

2.1-10. *Class I Structures License Renewal Industry Report,* NUMARC Report Number 90-06, Nuclear Management and Resources Council, Revision 1, December 1991.

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2.2 PLANT LEVEL SCOPING RESULTS

2.2.1 SYSTEMS, STRUCTURES AND COMPONENTS WITHIN THE SCOPE OF LICENSE RENEWAL

As described in Section 2.1 of this Application, the criteria that determine the systems, structures and components within the scope of license renewal are provided in 10 CFR §54.4. Guidance contained in Regulatory Guides 1.26 and 1.29 has been used to establish which McGuire and Catawba mechanical systems, structures and components that satisfy the scoping criteria in §54.4(a)(1) as described in Section 2.1.1.1 of this Application. All nonsafety-related systems, structures and components, whose failure could prevent satisfactory accomplishment of any of the functions identified in §54.4 (a)(1)(i), (ii), and (iii) are within the scope of license renewal and have been identified by the methodology described in Section 2.1.1.2 of this Application. Finally, in addition to those systems, structures and components relied upon to mitigate design basis events (§54.4(a)(1)), or whose failure could prevent mitigation of design basis events (§54.4(a)(2)), the systems, structures and components previously committed to support certain specific NRC regulations (§54.4(a)(3)) are within the scope of license renewal and have been identified by the methodology described in Section 2.1.1.3 of this Application.

The McGuire systems, structures and components that are within the scope of license renewal (§54.4) are listed in Table 2.2-1. The mechanical systems listed in this table are described in Section 2.3, System Scoping and Screening Results: Mechanical. Specifically, the Reactor Coolant System is described in Section 2.3.1, engineered safety features systems are described in Section 2.3.2, auxiliary systems are described in Section 2.3.3 and steam and power conversion systems are described in Section 2.3.4. The structures listed in Table 2.2-1 and their structural components are described in Section 2.4. The electrical and I&C components that are subject to an aging management review are described in Section 2.5.

The Catawba systems, structures and components that are within the scope of license renewal (§54.4) are listed in Table 2.2-2. The mechanical systems listed in this table are described in Section 2.3, System Scoping and Screening Results: Mechanical. Specifically, the Reactor Coolant System is described in Section 2.3.1, engineered safety features systems are described in Section 2.3.2, auxiliary systems are described in Section 2.3.3 and steam and power conversion systems are described in Section 2.3.4. The structures listed in Table 2.2-2 and their structural components are described in Section 2.4. The electrical I&C components that are subject to an aging management review are described in Section 2.5.

2.2.2 Systems and Structures Not within the Scope of License Renewal

To assist the staff is its review of scoping, tables are provided that identify systems and structures that are not within the scope of license renewal. None of the systems and structures listed in these tables meet any of the criteria contained in §54.4.

The McGuire systems and structures that are not within the scope of license renewal are listed in Table 2.2-3, McGuire Systems and Structures Not within the Scope of License Renewal.

The Catawba systems and structures that are not within the scope of license renewal are listed in Table 2.2-4, Catawba Systems and Structures Not within the Scope of License Renewal.

Table 2.2-1 McGuire Systems and Structures within the Scope of License Renewal

McGuire Mechanical Systems within the Scope of License Renewal

Annulus Ventilation
Auxiliary Building Ventilation
Auxiliary Feedwater
Auxiliary Steam
Boron Recycle
Chemical & Volume Control
Component Cooling
Condenser Circulating Water
Containment Air Return Exchange & Hydrogen Skimmer
Containment Spray
Control Area Chilled Water
Control Area Ventilation
Conventional Waste Water Treatment
Diesel Building Ventilation
Diesel Generator Air Intake And Exhaust
Diesel Generator Cooling Water
Diesel Generator Crankcase Vacuum
Diesel Generator Fuel Oil
Diesel Generator Lube Oil
Diesel Generator Room Sump Pump
Diesel Generator Starting Air
Feedwater
Feedwater Pump Turbine Hydraulic Oil
Fire Protection
Fuel Handling Building Ventilation
Groundwater Drainage
Heating Water
Hydrogen Bulk Storage
Instrument Air
Liquid Waste Monitor And Disposal
Liquid Waste Recycle
Lower Containment Ventilation
Main Steam
Main Steam Supply To Auxiliary Equipment
Main Steam Vent To Atmosphere
Main Turbine Hydraulic Oil
Main Turbine Lube Oil and Purification
Nitrogen
Nuclear Sampling
Nuclear Service Water
Nuclear Solid Waste Disposal
Reactor Coolant
Refueling Water
Residual Heat Removal
Safety Injection
Spent Fuel Cooling
Standby Shutdown Diesel
Turbine Building Ventilation
Turbine Exhaust
Upper Containment Ventilation
Waste Gas

Table 2.2-1 McGuire Systems and Structures within the Scope of License Renewal (continued)

The following McGuire mechanical systems are within the scope of license renewal only because a portion of each system provides valves and piping for containment isolation purposes. For convenience, these systems are described collectively in Section 2.3.2.2, Containment Isolation System:

Breathing Air	Ice Condenser Refrigeration
Containment Air Release & Addition System	Makeup Demineralized Water
Containment Purge Ventilation	Station Air
Containment Ventilation Cooling Water	Steam Generator Blowdown Recycle
Conventional Chemical Addition	Steam Generator Wet Lay-Up Recirculation
Equipment Decontamination	

Table 2.2-1 McGuire Systems and Structures within the Scope of License Renewal (continued)

McGuire Structures within the Scope of License Renewal

Auxiliary Building	Reactor Building Unit 2
Condenser Cooling Water Intake Structure (Fire Pump Room only)	Reactor Makeup Water Storage Tank Foundation
Control Building	Refueling Water Storage Tank Foundation
Diesel Generator Building Unit 1	Refueling Water Storage Tank Missile Wall
Diesel Generator Building Unit 2	Service Building
Groundwater Drainage System	Standby Nuclear Service Water Pond Dam
Main Steam Doghouses Unit 1	Standby Nuclear Service Water Pond Discharge Structure (Nuclear Service Water Discharge Structure)
Main Steam Doghouses Unit 2	Standby Nuclear Service Water Pond Intake Structure (Nuclear Service Water Intake Structure)
New Fuel Storage Building Unit 1	Spent Fuel Building Unit 1
New Fuel Storage Building Unit 2	Spent Fuel Building Unit 2
New Fuel Storage Vault Unit 1	Standby Shutdown Facility
New Fuel Storage Vault Unit 2	Turbine Building Unit 1
Trenches	Turbine Building Unit 2
Reactor Building Unit 1	Unit Vent Stack

Table 2.2-1 McGuire Systems and Structures within the Scope of License Renewal (continued)

McGuire Electrical Systems within the Scope of License Renewal

Electrical scoping was performed at the system and component level. Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet any of the scoping criteria of §54.4(a). Other electrical and instrumentation and control systems and components are within the scope of license renewal as part of a bounding scope. No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

Table 2.2-2 Catawba Systems and Structures within the Scope of License Renewal

Catawba Mechanical Systems within the Scope of License Renewal

Annulus Ventilation	Feedwater Pump Turbine Exhaust
Auxiliary Building Ventilation	Feedwater Pump Turbine Hydraulic Oil
Auxiliary Feedwater	Fire Protection
Auxiliary Steam	Fuel Handling Area Ventilation
Boron Recycle	Groundwater Drainage
Building Heating Water	Hydrogen Bulk Storage
Chemical & Volume Control	Instrument Air
Component Cooling	Liquid Radwaste
Condensate	Main Steam
Condensate Storage	Main Steam Auxiliary Equipment
Condenser Circulating Water	Main Steam Vent to Atmosphere
Containment Air Return Exchange & Hydrogen Skimmer	Main Turbine Hydraulic Oil
Containment Spray	Main Turbine Lube Oil and Purification
Containment Valve Injection Water	Miscellaneous Structures Ventilation
Control Area Chilled Water	Nitrogen
Control Room Area Ventilation	Nuclear Sampling
Diesel Building Ventilation	Nuclear Service Water
Diesel Generator Engine Air Intake & Exhaust	Nuclear Service Water Pump Structure Ventilation
Diesel Generator Engine Cooling Water	Reactor Coolant
Diesel Generator Engine Crankcase Vacuum	Recirculated Cooling Water
Diesel Generator Engine Fuel Oil	Refueling Water
Diesel Generator Engine Lube Oil	Residual Heat Removal
Diesel Generator Engine Starting Air	Safety Injection
Diesel Generator Room Sump Pump	Solid Radwaste
Drinking Water	Spent Fuel Cooling
Feedwater	

Table 2.2-2 Catawba Systems and Structures within the Scope of License Renewal

(continued)

Catawba Mechanical Systems within the Scope of License Renewal

Standby Shutdown Diesel	Waste Gas
Turbine Building Sump Pump	

The following Catawba mechanical systems are within the scope of license renewal only because a portion of each system provides valves and piping for containment isolation purposes. For convenience, these systems are described collectively in Section 2.3.2.2, Containment Isolation System:

Breathing Air	Ice Condenser Refrigeration
Containment Air Release & Addition	Make-up Demineralized Water
Containment Hydrogen Sample & Purge	Station Air
Containment Purge	Steam Generator Blowdown
Equipment Decontamination	Steam Generator Wet Layup Recirculation

Table 2.2-2 Catawba Systems and Structures within the Scope of License Renewal

(continued)

Catawba Structures within the Scope of License Renewal

Auxiliary Building	Reactor Building Unit 2
Control Complex	Refueling Water Storage Tank Foundation
Diesel Generator Building Unit 1	Refueling Water Storage Tank Missile Shield
Diesel Generator Building Unit 2	Refueling Water Storage Tank Pipe Trench
Doghouse Unit 1	Service Building
Doghouse Unit 2	Standby Nuclear Service Water Pond Dam
Fuel Building	Standby Nuclear Service Water Discharge Structure
Fuel Pool	Standby Nuclear Service Water Intake Structure
Groundwater Drainage System	Standby Nuclear Service Water Pond Outlet
Low Pressure Service Water Intake Structure	Standby Shutdown Facility
Nuclear Service Water and Standby Nuclear Service Water Pump Structure	Trenches
Nuclear Service Water Conduit Manholes	Turbine Building Unit 1
Nuclear Service Water Intake Structure	Turbine Building Unit 2
Reactor Building Unit 1	Unit Vent Stack
	Upper Head Injection Tank Building

Table 2.2-2 Catawba Systems and Structures within the Scope of License Renewal (continued)

Catawba Electrical Systems within the Scope of License Renewal

Electrical scoping was performed at the system and component level. Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet any of the scoping criteria of §54.4(a). Other electrical and instrumentation and control systems and components are within the scope of license renewal as part of a bounding scope. No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

Table 2.2-3 McGuire Systems and Structures Not within the Scope of License Renewal

McGuire Mechanical Systems Not within the Scope of License Renewal

Administration Building HVAC

Auxiliary Fuel Oil

Boron Thermal Regeneration

CO_2 Generator Purge

Condensate

Condensate Storage

Condenser Circulating Water Intake Screen Backwash

Condenser Cleaning

Condenser Steam Air Ejector

Conventional Low Pressure Service Water

Conventional Sampling

Drinking Water

Equipment Staging Building Ventilation

Feedwater Pump Condensate Seal

Feedwater Pump Turbine Lube Oil

Feedwater Pump Turbine Steam Seal

Filtered Water

Generator Hydrogen System

Generator Seal Oil

Generator Stator Cooling

Heater Bleed Steam A, B, C, D, E, F, G

Heater Drains

Heater Relief Valves

Heater Vents

Heating Boiler Feedwater

Heating Boiler Fuel Gas

Hydrogen Blanket

Incore Instrumentation Area Ventilation

Main Steam Bypass To Condenser

Main Steam To Feedwater Pump Turbine

Main Turbine Leakoff & Steam Seal

Main Vacuum

Miscellaneous Outside Structures HVAC

Moisture Separator-Reheater Bleed Steam

Moisture Separator-Reheater Drains

On-Site Technical Support Center Ventilation

Oxygen

Reactor Building / Control Rod Drive Ventilation

Recirculated Cooling Water

Sanitation And Waste Treatment

Service Building And Warehouse Ventilation

Turbine Crossover

Turbine Room Sump Pump

Unwatering Pump System

Vacuum Priming

Waste Oil

Table 2.2-3 McGuire Systems and Structures Not within the Scope of License Renewal

(continued)

McGuire Structures Not within the Scope of License Renewal

230 kV Switch Station Steel and Foundation	Earthen Dam and Dike Extension of Cowans Ford Dam North of McGuire
525 kV Switch Station	Equipment Staging Building
Administration Building	Final Holdup Pond
Advanced Training Facility	Guardhouse
Bahnson Building	Hazardous Waste Storage Facility / Bottle Gas Storage
Ballistics Vault	Hydrogen Storage Facility
BBQ Shed	Initial Holding Pond
Blower House	Landfill Area
Canteen, Office & Warehouse	McGuire Garage
Condenser Circulating Water Low Level Intake Structure	McGuire Office Complex
Condenser Circulating Water Low Level Pump Structure	Meteorological Instrument House
Chemical Mixing	Mulsifyer Houses (7)
CO_2 Cylinder Storage House	Nitrogen Storage Facility
Communications Back-up Diesel Building	North Personnel Access Portal
Communications Buildings (3)	Office Building (2)
Compacted Waste Storage Building	Office Shop Building
Condenser Cooling Water Intake Structure (except the Fire Pump Rooms)	Oil Storage House
Condenser Discharge Structure	Oil Water Separator Building
Contract Services Building	Operations Office Addition
Corporate Medical Facility	Oxygen Storage Facility
Cowans Ford Auxiliary Intake Structure	Paint Shed
Cowans Ford Dam	Picnic Shelter
Demineralized Water Processing Building & Equipment	Pumphouse
Diesel Building (#7434)	Pumphouse Fish Tank

Table 2.2-3 McGuire Systems and Structures Not within the Scope of License Renewal

(continued)

McGuire Structures Not within the Scope of License Renewal

(continued)

Radiographics Shooting Vault	Training Stand & Storage
Radwaste Facility	Transmitter Shelters (4)
Recirculation Pump House	Upper McGuire Hydro Office
Relay House	Warehouses (2)
Restroom	Waste Solidification Building
Retired Steam Generator Storage Facility	Waste Treatment Pumphouse / Chemical Mixing Station
Settling Pond A,B	Waste Water Collection Basin Dam (Non-Nuclear Waste)
Shed	Water Treatment Supply
Storage Buildings (5)	Wellhouse
Target Storage	Yard Equipment Storage Building

McGuire Electrical Systems Not within the Scope of License Renewal

Electrical scoping was performed at the system and component level. Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet any of the scoping criteria of §54.4(a). Other electrical and instrumentation and control systems and components are within the scope of license renewal as part of a bounding scope. No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

Table 2.2-4 Catawba Systems and Structures Not within the Scope of License Renewal

Catawba Mechanical Systems Not within the Scope of License Renewal

Administration Building Chilled Water
Administration Building Ventilation
Auxiliary Boiler Feedwater
Auxiliary Building Cooling Water
Boron Thermal Regeneration
Catawba Steam Production Office Chilled Water
Chemical Cleaning
Computer Area Ventilation
Computer Room Area Chilled Water
Condenser Cleaning
Condenser Steam Air Ejector
Containment Chilled Water
Containment Ventilation
Conventional Chemical Addition
Conventional Low Pressure Service Water
Conventional Sampling
Conventional Waste Water Treatment
Cooling Tower Water Treatment
Feedwater Pump Condensate Seal
Feedwater Pump Turbine Lube Oil
Feedwater Pump Turbine Steam Seal
Filtered Water
Generator CO_2 Purge
Generator Hydrogen
Generator Seal Oil
Generator Stator Cooling Water
Heater Bleed Steam A, B, C, D, E, F And G
Heater Drain
Heater Relief Valve
Heater Vent
Hydrogen Blanket
Low Pressure Service Water Intake Screen Backwash
Main Steam Bypass To Condenser
Main Turbine Leakoff And Steam Seal
Main Vacuum
Moisture Separator Reheater Bleed Steam
Moisture Separator Reheater Drain
Monitor Tank Building HVAC
On-Site Technical Support Center Ventilation
Oxygen
Radwaste Area Chilled Water
Sanitation And Waste Treatment
Service Building Chilled Water
Service Building Sump Pump
Service Building Ventilation
Steam Supply To Feedwater Pump Turbine
Turbine Building Ventilation
Turbine Crossover
Turbine Exhaust Hood Spray
Unwatering Pump
Vacuum Priming

Table 2.2-4 Catawba Systems and Structures Not within the Scope of License Renewal

(continued)

Catawba Structures Not within the Scope of License Renewal

230 kV Switching Station	Maintenance Training Facility
Administration Building	Medical Facility
Bottled Gas Storage House	Metal Fabrication Shop
Carpenter Shop	Microwave & Environmental Building
Chlorination House	Monitor Tank Building
Communication Building	Motor Control Center House
Compressor Shed (2)	MTU Communication Building
Containment Mechanical Equipment Building Unit 1	Nitrogen Storage Building
Containment Mechanical Equipment Building Unit 2	Office Buildings (3)
Contaminated Material Storage & Warehouse	Office Complex
Cooling Towers	Oxygen Storage Building
Discharge Canal and Dike	Paint Drying Shed
Electrical Cable Trenches	Paint Mix/Storage Building
Energyquest	Paint Storage Building
Gang Box Storage Building	Picnic Shed
Garage	Pipe Cut Shed
Guardhouse	Pole Shed
Hazardous Waste Storage Building	Pole Storage
Hot Machine Shop	Pumphouse
HVAC/Chemical Storage	Relay House
Hydrogen Storage House	Restrooms
Low Pressure Service Water Canal and Dike	Restrooms @ CNS Park
Low Pressure Service Water Discharge Structure	Retired Steam Generator Facility
Lube Oil Storage House	Radiation Protection Storage Tent
Maintenance Facility	Sandblast Building

Table 2.2-4 Catawba Systems and Structures Not within the Scope of License Renewal

(continued)

Catawba Structures Not within the Scope of License Renewal

(continued)

Shed	Training Building
Spare Diesel Generator	Truck Tent
Standby Nuclear Service Water Pond Instrument Pier	Warehouses (4)
Steam Generator Drain Tank Building	Water Chemistry Building
Target Range House	Wellhouses (2)

Catawba Electrical Systems Not within the Scope of License Renewal

Electrical scoping was performed at the system and component level. Switchyard Systems, Unit Main Power System, Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System and uninsulated ground conductors were found not to meet any of the scoping criteria of §54.4(a). Other electrical and instrumentation and control systems and components are within the scope of license renewal as part of a bounding scope. No scoping was performed for insulated cables and connections and all insulated cables and connections are in scope as part of a bounding scope.

2.3 SYSTEM SCOPING AND SCREENING RESULTS: MECHANICAL

2.3.1 REACTOR COOLANT SYSTEM

Note: The Reactor Coolant System description and component descriptions are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The methodology to identify the mechanical systems within the scope of license renewal is described in Section 2.1 of this Application. Section 2.1.2.1 contains a description of the methodology to identify the mechanical components that are subject to aging management review.

Systems, structures and components are located in this section consistent with their locations in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (July 1981) except where the internal operating environment or function suggests a more appropriate location within the Application. In these situations, the system, structure or component has been located in the more appropriate section. For example, Class 1 Component Supports which are normally described within Chapter 5 of NUREG-0800, are described in Section 2.4 of this Application because they are functionally structural components and are included in Section 2.4 of the draft Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants (August 2000).

This section of the Application applies to the Class 1 portions of the Reactor Coolant System and ancillary piping from adjoining systems that form the Reactor Coolant pressure boundary. The license renewal evaluation boundaries for the Class 1 portions of the Reactor Coolant System extend onto the flow diagrams of the following systems:

- Safety Injection System
- Chemical and Volume Control System
- Residual Heat Removal System

Non-class 1 portions of the Reactor Coolant System are described in Section 2.3.3 of this Application. The Reactor Coolant Pump Motor Oil Collection Sub-System is described in Section 2.3.3.31 and the Reactor Coolant System (Non-Class Components) are described in Section 2.3.3.32. The following Reactor Coolant System Class 1 components are described in Section 2.3.1, Reactor Coolant System:

- Class 1 Piping, Valves, and Pumps
- Pressurizer
- Reactor Vessel and Control Rod Drive Mechanism Pressure Boundary

- Reactor Vessel Internals
- Steam Generator

2.3.1.1 Reactor Coolant System Description

The Reactor Coolant System consists of four similar heat transfer loops connected in parallel to the reactor pressure vessel. Each loop contains a reactor coolant pump, 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 Reactor Coolant System transfers the heat generated in the core to the steam generators where steam is produced to drive the turbine generator. Borated demineralized water is circulated in the Reactor Coolant System 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 Reactor Coolant System 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. Reactor Coolant System 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 are mounted on the pressurizer and discharge to the pressurizer relief tank, where the steam is condensed and cooled by mixing with water.

The McGuire UFSAR Chapter 5, Reactor Coolant System, provides additional information concerning the McGuire Reactor Coolant System. The mechanical components, component functions, and materials of construction for the McGuire Reactor Coolant System are listed in Table 3.1-1. The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Reactor Coolant System:

MCFD-1553-01.00	MCFD-1562-02.00	MCFD-2554-01.01
MCFD-1553-02.00	MCFD-1562-02.01	MCFD-2554-01.02
MCFD-1553-02.01	MCFD-1562-03.00	MCFD-2561-01.00
MCFD-1554-01.00	MCFD-1562-03.01	MCFD-2562-01.00
MCFD-1554-01.01	MCFD-2553-01.00	MCFD-2562-02.00
MCFD-1554-01.02	MCFD-2553-02.00	MCFD-2562-02.01
MCFD-1561-01.00	MCFD-2553-02.01	MCFD-2562-03.00
MCFD-1562-01.00	MCFD-2554-01.00	MCFD-2562-03.01

These flow diagrams are contained in Reference [2.3.1-1]

The Catawba UFSAR Chapter 5, Reactor Coolant System, provides additional information concerning the Catawba Reactor Coolant System. The mechanical components, component functions, and materials of construction for the Catawba Reactor Coolant System are listed in Table 3.1-1. The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Reactor Coolant System:

CN-1553-1.0	CN-1562-1.1	CN-2561-1.0
CN-1553-1.1	CN-1562-1.2	CN-2561-1.1
CN-1554-1.0	CN-1562-1.3	CN-2562-1.0
CN-1554-1.5	CN-2553-1.0	CN-2562-1.1
CN-1561-1.0	CN-2553-1.1	CN-2562-1.2
CN-1561-1.1	CN-2554-1.0	CN-2562-1.3
CN-1562-1.0	CN-2554-1.5	

These flow diagrams are contained in Reference [2.3.1-1].

2.3.1.2 Class 1 Piping, Valves and Pumps

The Reactor Coolant System Class 1 piping and associated pressure boundary components consist of:

- Westinghouse supplied primary loop piping which interconnects the reactor vessel, steam generators, and reactor coolant pumps;
- Duke-designed Class 1 piping;
- Pressure boundary portion of Class 1 valves (bodies and bonnets, bolting); and
- 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, steam generator 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 itself.

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 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 Reactor Coolant System are equipped with 3/8 inch ID flow restricting orifices that limit the maximum flow from a break downstream of the flow restrictor to below the makeup capability of the Reactor Coolant System. This orifice is used to make the break from Class 1 to Class 2 instead of double isolation valves.

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 aging management review 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 McGuire UFSAR Section 5.5, Component and Subsystem Design, provides additional information concerning the McGuire Reactor Coolant System Class 1 piping and associated pressure boundary components. The Catawba UFSAR Section 5.4, Component and Subsystem Design, provides additional information concerning the Catawba Reactor Coolant System Class 1 piping and associated pressure boundary components. The mechanical components, component functions, and materials of construction for the McGuire and Catawba Reactor Coolant System Class 1 piping and associated pressure boundary components are listed in Table 3.1-1.

2.3.1.3 Pressurizer

The pressurizer is a vertical, cylindrical vessel with hemispherical top and bottom heads that is connected to the Reactor Coolant System 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 McGuire UFSAR Section 5.5.10, Pressurizer, provides additional information concerning the McGuire pressurizer. The Catawba UFSAR Section 5.4.10, Pressurizer, provides additional information concerning the Catawba pressurizer. The mechanical components, component functions, and materials of construction for all four of the McGuire and Catawba pressurizers are listed in Table 3.1-1.

2.3.1.4 Reactor Vessel and Control Rod Drive Mechanism Pressure Boundary

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 control rod drive mechanism penetrations 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 core barrel-vessel wall annulus, 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 of 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 McGuire UFSAR Section 5.4, Reactor Vessel, provides additional information concerning the McGuire reactor vessel. The Catawba UFSAR Section 5.3, Reactor Vessel, provides additional information concerning the Catawba reactor vessel. The mechanical components, component functions, and materials of construction for all four of the McGuire and Catawba reactor vessels are listed in Table 3.1-1.

2.3.1.5 Reactor Vessel Internals

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 reactor vessel internals support the core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and control rod drive mechanisms, 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 McGuire UFSAR Section 4.2.2, Reactor Vessel Internals, provides additional information concerning the McGuire reactor vessel internals. The Catawba UFSAR Section 3.9.5, Reactor Vessel Internals, provides additional information concerning the Catawba reactor vessel internals. The mechanical components, component functions, and materials of construction for all four of the McGuire and Catawba reactor vessel internals are listed in Table 3.1-1.

2.3.1.6 Steam Generator

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

All steam generators 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 steam generator. 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 steam generator. Feedwater flows directly into a downcomer section and is mixed with saturated recirculation flow before entering the tube bundle for the replacement steam generators. The Catawba Unit 2 steam generators are equipped with a preheater and feedwater flow restrictor 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 McGuire UFSAR Section 5.5.2, Steam Generator, provides additional information concerning the McGuire steam generators. The Catawba UFSAR Section 5.4.2, Steam Generator, provides additional information concerning the Catawba steam generators. The mechanical components, component functions, and materials of construction for all sixteen of the McGuire and Catawba steam generators are listed in Table 3.1-1.

2.3.1.7 References for Section 2.3.1

2.3.1-1. M. S. Tuckman (Duke) letter dated June 13, 2001 to Document Control Desk (NRC), *License Renewal Evaluation Boundary Drawings.* McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-369, 50-370, 50-413, and 50-414.

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2.3.2 ENGINEERED SAFETY FEATURES

The methodology to identify the mechanical systems within the scope of license renewal is described in Section 2.1.1of this Application. Section 2.1.2.1 contains a description of the methodology to identify the mechanical components that are subject to aging management review.

Systems, structures and components are located in this section consistent with their locations in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (July 1981) except where the internal operating environment or function suggests a more appropriate location within the Application. In these situations, the system, structure or component has been located in the more appropriate section. For example, the Refueling Water System which is normally described within Chapter 9 of NUREG-0800, is described in this Section of the Application because of its function to support Engineered Safety Features and its internal operating environment is the same as many of the other systems contained in this section of the Application.

The following mechanical systems are described in Section 2.3.2, Engineered Safety Features in the section indicated:

- Annulus Ventilation System (Section 2.3.2.1)
- Containment Isolation System (Section 2.3.2.2)
- Containment Air Return Exchange & Hydrogen Skimmer System (Section 2.3.2.3)
- Containment Spray System (Section 2.3.2.4)
- Containment Valve Injection Water System (Section 2.3.2.5)
- Refueling Water System (Section 2.3.2.6)
- Residual Heat Removal System (Section 2.3.2.7)
- Safety Injection System (Section 2.3.2.8)

2.3.2.1 Annulus Ventilation System

McGuire Nuclear Station – The Annulus Ventilation System is an engineered safety feature that creates and maintains 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 loss-of-coolant-accident (LOCA). The Annulus Ventilation System is also designed to maintain Containment isolation integrity. The McGuire UFSAR Section 6.2 , Containment Systems, provides additional information concerning the McGuire Annulus Ventilation System. The mechanical components, component functions, and materials of construction for the McGuire Annulus Ventilation System are listed in Table 3.2-1.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Annulus Ventilation System:

MC-1564-1.0	MC-2564-1.0
MC-1577-1.0	MC-2577-1.0

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Annulus Ventilation System is an engineered safety feature used in conjunction with the Secondary Containment to limit operator and site boundary doses, following a Design Basis Accident, to within the guidelines specified in 10 CFR 100 and provides long-term, fission product removal capability within the annulus through holdup and filtration. The Catawba UFSAR Section 6.2, Containment Systems, provides additional information concerning the Catawba Annulus Ventilation System. The mechanical components, component functions, and materials of construction for the Catawba Annulus Ventilation System are listed in Table 3.2-1.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Annulus Ventilation System:

CN-1564-1.0	CN-2564-1.0
CN-1577-3.0	CN-2577-3.0

These flow diagrams are contained in Reference [2.3.2-1]

2.3.2.2 Containment Isolation System

Note: The Containment Isolation System is an engineered safety feature that provides for the closure of all fluid penetrations not required for operation of the Engineered Safeguards System to prevent the leakage of uncontrolled or unmonitored radioactive materials to the environment. Where specific differences exist between McGuire and Catawba, a brief explanation is provided. Section 6.2.4, Containment Isolation Systems, of each station's UFSAR provide additional information on the containment isolation feature of the systems described in Section 2.3.2.2.

2.3.2.2.1 BREATHING AIR SYSTEM

McGuire Nuclear Station – The Breathing Air System provides an adequate capacity of air to meet appropriate American National Standards Institute (ANSI) specifications. Two full capacity compressors are provided to furnish the total average breathing air requirements. The Breathing Air System is also relied upon to provide and maintain Containment isolation and closure. The Breathing Air System contains Duke Class B piping and components for Containment isolation. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The McGuire UFSAR Section 9.3.1, Compressed Air Systems, provides additional information concerning the McGuire Breathing Air System. The mechanical components, component functions, and materials of construction for the McGuire Breathing Air System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Breathing Air System:

MCFD-1605-03.01 MCFD-2605-03.01

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Breathing Air System supplies clean, oil free, compressed air to various locations in the Auxiliary Building, Monitor Tank Building, and Containment for breathing protection against airborne contamination while performing certain maintenance and cleaning operations. The Breathing Air System is relied upon to provide and maintain Containment isolation and closure. The Breathing Air System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The Catawba UFSAR Section 9.3.1, Compressed Air Systems, provides additional information concerning the Breathing Air System. The mechanical components, component functions, and materials of construction for the Catawba Breathing Air System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Breathing Air System:

CN-1605-3.1	CN-1605-3.2	CN-2605-3.2

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.2 CONTAINMENT AIR RELEASE AND ADDITION SYSTEM

McGuire Nuclear Station – The Containment Air Release and Addition System maintains containment pressure between the McGuire Technical Specification limits of -0.3 to +0.3 psig. Increases in pressure during normal operation are controlled by venting the containment through the Containment Air Release and Addition filters. The Containment Air Release and Addition System contains Duke Class B piping and components for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The McGuire UFSAR Section 9.5.12, Containment Air Release and Addition System, provides additional information concerning the McGuire Containment Air Release and Addition System. The mechanical components, component functions, and materials of construction for the McGuire Containment Air Release and Addition System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Containment Air Release and Addition System:

MCFD-1585-01.00	MCFD-2585-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Containment Air Release and Addition System maintains containment pressure between the Catawba Technical Specification limits of -0.1 to +0.3 psig during normal plant operation. An increase in pressure during normal operation is controlled by the containment air release fans taking suction from the containment and passing through the containment air release filters. The Containment Air Release and Addition System contains Duke Class B piping and components for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The Catawba UFSAR Section 9.5.10, Containment Air Release and Addition System, provides additional information concerning the Containment Air Release and

Addition System. The mechanical components, component functions, and materials of construction for the Catawba Containment Air Release and Addition System are listed in Table 3.2-2.

The following is a list of the flow diagrams and instrument details that have been marked to indicate the license renewal evaluation boundary for the Catawba Containment Air Release and Addition System:

CN-1585-1.0	CN-1499-VQ-04.00
CN-2585-1.0	CN-2499-VQ-04.00

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.3 CONTAINMENT HYDROGEN SAMPLE AND PURGE SYSTEM

McGuire Nuclear Station – No system corresponding to the Catawba Containment Hydrogen Sample and Purge System exists at McGuire.

Catawba Nuclear Station – The Containment Hydrogen Sample and Purge System is used after a loss-of-coolant accident (LOCA) to monitor the hydrogen concentration inside Containment, and if necessary, reduce the levels of hydrogen by manually purging the hydrogen from Containment into the annulus. The Containment Hydrogen Sample and Purge System contains Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The Catawba UFSAR Section 6.2.5.3.2, Containment Hydrogen Sample and Purge System, provides additional information concerning the Containment Hydrogen Sample and Purge System. The mechanical components, component functions, and materials of construction for the Catawba Containment Hydrogen Sample and Purge System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Containment Hydrogen Sample and Purge System:

CN-1559-1.0	CN-2559-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.4 CONTAINMENT PURGE VENTILATION SYSTEM

McGuire Nuclear Station – The Containment Purge Ventilation System reduces the airborne radioactivity levels in containment by purging the upper containment atmosphere to the environment via the unit vent stack during periods of sustained personnel access (including refueling). The Containment Purge Ventilation System contains Duke Class B piping for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The McGuire UFSAR Section 9.4.5, Containment, provides additional information concerning the McGuire Containment Purge Ventilation System. The mechanical components, component functions, and materials of construction for the McGuire Containment Purge Ventilation System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Containment Purge Ventilation System:

MC-1576-01.00	MC-2576-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Containment Purge System reduces the airborne radioactivity levels in containment by purging the upper containment, lower containment, and the incore instrumentation room atmosphere to the unit vent stack during refueling when periods of personnel access are required. The Containment Purge System contains Duke Class B piping for the containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The Catawba UFSAR Section 9.4.5, Containment Purge Ventilation System, provides additional information concerning the Containment Purge System. The mechanical components, component functions, and materials of construction for the Catawba Containment Purge System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Containment Purge System:

CN-1576-1.0	CN-2576-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.5 CONTAINMENT VENTILATION COOLING WATER SYSTEM

McGuire Nuclear Station – The Containment Ventilation Cooling Water System operates in conjunction with the Nuclear Service Water System to supply cooling water to ventilation units located in the Reactor and Auxiliary Buildings. The Containment Ventilation Cooling Water System contains Duke Class B and C piping for the containment isolation function. All components within the Duke Class B and C boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The McGuire UFSAR Section 6.2.4, Containment Isolation Systems, provides additional information concerning the McGuire Containment Ventilation Cooling Water System. The mechanical components, component functions, and materials of construction for the McGuire Containment Ventilation Cooling Water System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Containment Ventilation Cooling Water System:

MCFD-1574-01.00	MCFD-1604-03.03	MCFD-2604-03.01
MCFD-1604-03.00	MCFD-2604-03.00	

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – This system does not exist at Catawba. The comparable components cooled by the McGuire Containment Ventilation Cooling Water System are cooled by the Catawba Nuclear Service Water System.

2.3.2.2.6 CONVENTIONAL CHEMICAL ADDITION SYSTEM

McGuire Nuclear Station – The Conventional Chemical Addition System uses the Auxiliary Feedwater supply headers to provide chemical addition to the steam generators. The Conventional Chemical Addition System contains Duke Class B piping for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The McGuire UFSAR Section 6.2.4, Containment Isolation Systems, provides additional information concerning the McGuire Conventional Chemical Addition System. The mechanical components, component functions, and materials of construction for the McGuire Conventional Chemical Addition System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Conventional Chemical Addition System:

MCFD-1617-01.00 MCFD-2617-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – This system does not exist at Catawba. The comparable components to the McGuire Conventional Chemical Addition System are contained in the Catawba Auxiliary Feedwater System.

2.3.2.2.7 EQUIPMENT DECONTAMINATION

McGuire Nuclear Station – The Equipment Decontamination System provides decontamination of station equipment before handling by personnel. The original design of McGuire included Containment isolation capability. This design is now different than the design of Catawba. The original design has been modified by the installation of a sleeve cap on the annulus side of the penetration. Associated with the capped penetration is some remaining piping and components designated as Class F. These piping and components have been determined to have no component intended function. Therefore, no mechanical components in the Equipment Decontamination System are subject to aging management review. The sleeve cap and penetration and Class F supports are addressed as part of the Structural review discussed in Section 2.4 of the Application.

The following is a list of the flow diagrams that show the design of the McGuire Equipment Decontamination System:

MCFD-1568-01.00	MCFD-2568-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Equipment Decontamination System provides cleaning and decontamination of radioactive equipment prior to handling, maintenance or shipping. The Equipment Decontamination System and its components are not safety related, with the exception of the portions associated with Containment Isolation. The Equipment Decontamination System is relied upon to maintain two trains of containment isolation and maintain containment closure for shutdown. The Equipment Decontamination System contains Duke Class B pipe for the containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The Catawba UFSAR Section 6.2.4, Containment Isolation System, provides additional information concerning the Containment Isolation System. The mechanical components, component functions, and materials of construction for the Catawba Equipment Decontamination System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Equipment Decontamination System:

CN-1568-1.0	CN-2568-1.0
CN-1570-1.0	CN-2570-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.8 ICE CONDENSER REFRIGERATION

McGuire Nuclear Station – The primary safety function of the Ice Condenser Refrigeration System is to rapidly reduce, consistent with the functioning of other associated systems, the containment pressure and temperature following any LOCA and maintain them at acceptable levels. The safety-related function of the mechanical systems portion of the Ice Condenser Refrigeration System is Containment isolation. The Ice Condenser Refrigeration System contains Duke Class B piping and components for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The McGuire UFSAR Section 6.2.2, Ice Condenser System, provides additional information concerning the McGuire Ice Condenser Refrigeration System. The mechanical components, component functions, and materials of construction for the McGuire Ice Condenser Refrigeration System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Ice Condenser Refrigeration System:

MCFD-1558-04.00	MCFD-2558-04.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The primary safety function of the Ice Condenser Refrigeration System is to rapidly reduce, consistent with the functioning of other associated systems, the containment pressure and temperature following any LOCA and maintain them at acceptable levels. The safety-related function of the mechanical systems portion of the Ice Condenser Refrigeration System is Containment isolation. The Ice Condenser Refrigeration System contains Duke Class B piping and components for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The Catawba UFSAR Section 6.7.6, Refrigeration System, provides additional information concerning the Ice Condenser Refrigeration System. The mechanical components, component functions, and materials of construction for the Catawba Ice Condenser Refrigeration System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Ice Condenser Refrigeration System:

CN-1558-1.0	CN-1558-2.0	CN-2558-2.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.9 MAKEUP DEMINERALIZED WATER SYSTEM

McGuire Nuclear Station – The Makeup Demineralized Water System provides treated and demineralized water to various plant systems and components. The Demineralized Water System contains Duke Class B piping and components for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The McGuire UFSAR Section 9.2.6, Treated Water Systems, provides additional information concerning the McGuire Demineralized Water System. The mechanical components, component functions, and materials of construction for the McGuire Demineralized Water System are listed in Table 3.2-2.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the McGuire Demineralized Water System:

MCFD-1601-02.04

This flow diagram is contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Makeup Demineralized Water System provides treated and demineralized water to various plant systems and components. The Makeup Demineralized Water System contains Duke Class B piping and components for the Containment isolation function. All components within the Duke Class B boundaries are within the scope of license renewal per §54.4(a)(1). The Catawba UFSAR Section 9.2.3, Makeup Demineralized Water System, provides additional information concerning the Makeup Demineralized Water System. The mechanical components, component functions, and materials of construction for the Catawba Makeup Demineralized Water System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Makeup Demineralized Water System:

CN-1601-3.1	CN-1601-3.5	CN-2556-2.0
CN-1601-3.2	CN-1556-2.0	

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.10 STATION AIR SYSTEM

McGuire Nuclear Station – The Station Air System provides an adequate capacity for general station service air requirements. Normally, the Instrument Air System provides the station air requirements through system cross-connect valves. However, if needed, one Station Air System compressor is provided to furnish the station air requirements if the Instrument Air System is not available or desired. The Station Air System is also relied upon to provide and maintain Containment isolation and closure. The Station Air System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The McGuire UFSAR Section 9.3.1, Compressed Air Systems, provides additional information concerning the McGuire Station Air System. The mechanical components, component functions, and materials of construction for the McGuire Station Air System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Station Air System:

MCFD-1605-02.02 MCFD-2605-02.02

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Station Air System supplies low pressure compressed air for air operated tools, miscellaneous equipment, and various maintenance purposes. The Station Air System, if required, is available to act as a backup supply of compressed air for the Instrument Air System. The Station Air System is relied upon to provide and maintain Containment isolation and closure. The Station Air System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The Catawba UFSAR Section 9.3.1, Compressed Air Systems, provides additional information concerning the Catawba Station Air System. The mechanical components, component functions, and materials of construction for the Catawba Station Air System are listed in Table 3.2-2.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the Catawba Station Air System:

CN-1605-2.1

This flow diagram is contained in Reference [2.3.2-1].

2.3.2.2.11 STEAM GENERATOR BLOWDOWN RECYCLE SYSTEM

McGuire Nuclear Station – The Steam Generator Blowdown Recycle System is used in conjunction with the Condensate System to maintain acceptable secondary side water chemistry and control corrosion product buildup. The Steam Generator Blowdown Recycle System is designed to maintain containment isolation integrity. The system automatically isolates the blowdown lines penetrating the containment following receipt of a containment isolation signal and also following a start signal of the Auxiliary Feedwater System. The Steam Generator Blowdown Recycle System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The McGuire UFSAR Section 10.4.8, Steam Generator Blowdown System, provides additional information concerning the McGuire Steam Generator Blowdown Recycle System. The mechanical components, component functions, and materials of construction for the McGuire Steam Generator Blowdown Recycle System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Steam Generator Blowdown Recycle System:

MCFD-1580-01.00	MCFD-2580-01.00
MCFD-1580-01.01	MCFD-2580-01.01
MCFD-1584-01.00	MCFD-2584-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Steam Generator Blowdown System is used in conjunction with the Condensate System to maintain acceptable secondary side water chemistry and control corrosion product buildup. The Steam Generator Blowdown System is designed to maintain containment isolation integrity. The system automatically isolates the blowdown lines penetrating the containment following the receipt of a containment isolation signal, and also, following a start signal of the Auxiliary Feedwater System. The Steam Generator Blowdown System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The Catawba UFSAR

Section 10.4.8, Steam Generator Blowdown System, provides additional information concerning the Steam Generator Blowdown System. The mechanical components, component functions, and materials of construction for the Catawba Steam Generator Blowdown System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Steam Generator Blowdown System:

CN-1565-2.6	CN-2565-2.6
CN-1580-1.0	CN-2580-1.0
CN-1584-1.0	CN-2584-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.2.12 STEAM GENERATOR WET LAY-UP RECIRCULATION SYSTEM

McGuire Nuclear Station – The Steam Generator Wet Lay-Up Recirculation System maintains containment isolation integrity. The Steam Generator Wet Lay-Up Recirculation System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The McGuire UFSAR Section 6.2.4, Containment Isolation System, provides additional information concerning the Steam Generator Wet Lay-Up Recirculation System. The mechanical components, component functions, and materials of construction for the McGuire Steam Generator Wet Lay-Up Recirculation System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Steam Generator Wet Lay-Up Recirculation System:

MCFD-1584-01.00	MCFD-2584-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Steam Generator Wet Lay-Up Recirculation System maintains containment isolation integrity. The Steam Generator Wet Lay-Up Recirculation System contains Duke Class B piping and components for the Containment isolation function. All piping and components within the Duke Class B boundaries are within the scope of license renewal in accordance with §54.4(a)(1). The Catawba UFSAR Section 10.4.8, Steam Generator Blowdown System, provides additional information concerning the Steam Generator Blowdown System. The mechanical components, component functions, and materials of construction for the Catawba Steam Generator Wet Lay-Up Recirculation System are listed in Table 3.2-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Steam Generator Wet Lay-Up Recirculation System:

CN-1584-1.0 CN-2584-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.3 Containment Air Return Exchange & Hydrogen Skimmer System

McGuire Nuclear Station – The Containment Air Return Exchange and Hydrogen Skimmer System (1) maintains Containment pressure less than the design pressure during any high energy line break (HELB), (2) ensures hydrogen concentration remains less than the flammability limit during a loss-of-coolant-accident (LOCA), and (3) maintains Containment isolation integrity for the system piping penetrating the Containment. The McGuire UFSAR Section 6.2, Containment Systems, provides additional information concerning the McGuire Containment Air Return Exchange and Hydrogen Skimmer System. The mechanical components, component functions, and materials of construction for the McGuire Containment Air Return Exchange and Hydrogen Skimmer System are listed in Table 3.2-3.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Containment Air Return Exchange and Hydrogen Skimmer System:

MC-1557-1.0 MC-2557-1.0

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Containment Air Return Exchange and Hydrogen Skimmer System (1) maintains Containment pressure less than the design pressure during any high energy line break (HELB), (2) ensures hydrogen concentration remains less than the flammability limit during a loss-of-coolant-accident (LOCA), and (3) maintains Containment isolation integrity for the system piping penetrating the Containment. The Catawba UFSAR Section 6.2, Containment Systems, provides additional information concerning the Catawba Containment Air Return Exchange and Hydrogen Skimmer System. The mechanical components, component functions, and materials of construction for the Catawba Containment Air Return Exchange and Hydrogen Skimmer System are listed in Table 3.2-3.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Containment Air Return Exchange and Hydrogen Skimmer System:

CN-1557-1.0 CN-2557-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.4 Containment Spray System

McGuire Nuclear Station – The Containment Spray System is an engineered safety feature that serves to remove thermal energy from the Containment in the event of a loss-of-coolant-accident or a Main Steam Line Break. It performs this function in conjunction with the Emergency Core Cooling System, which subcools the reactor by direct injection. After all the ice in the ice condenser has melted, the heat removal capability of the spray system will keep the Containment pressure below the design pressure. The Containment Spray System also serves to remove fission product iodine from the post-accident Containment atmosphere. The McGuire UFSAR Section 6.5, Containment Spray System, provides additional information concerning the McGuire Containment Spray System. The mechanical components, component functions, and materials of construction for the McGuire Containment Spray System are listed in Table 3.2-4.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Containment Spray System:

MCFD-1563-01.00 MCFD-2563-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Catawba Containment Spray System is an engineered safeguard feature that serves to remove thermal energy from the Containment atmosphere in the event of a loss-of-coolant-accident. It performs this function in conjunction with the Emergency Core Cooling System, which cools the reactor during injection and recirculation modes of operation. The heat removal capability of the spray system maintains containment pressure below the design pressure value after the ice in the Ice Condenser has been depleted, and steam generated in the core continues to enter Containment. The Containment Spray System also serves to remove fission product iodine from the post-accident Containment atmosphere. In addition, the Containment Spray System is designed for the suppression of steam partial pressure in the upper Containment volume due to operating deck leakage from a LOCA. The Catawba UFSAR Section 6.2.2, Containment Heat Removal Systems, provides additional information concerning the Catawba Containment Spray System. The mechanical components, component functions, and materials of construction for the Catawba Containment Spray System are listed in Table 3.2-4.

The following is a list of the flow diagrams and instrument details that have been marked to indicate the license renewal evaluation boundary for the Catawba Containment Spray System:

CN-1499-NS.02-00	CN-2499-NS.02-00
CN-1499-VQ.04-00	CN-2499-VQ.04-00
CN-1563-1.0	CN-2563-1.0

These flow diagrams and instrument details are contained in Reference [2.3.2-1].

2.3.2.5 Containment Valve Injection Water System

McGuire Nuclear Station – The design and licensing basis of McGuire Nuclear Station does not contain any system that is functionally equivalent to the Catawba Containment Valve Injection Water System.

Catawba Nuclear Station – The Containment Valve Injection Water System is designed to inject water between the two seating surfaces of double disc gate valves used for Containment isolation. The injection pressure is higher than Containment design peak pressure during a LOCA. This will prevent leakage of the Containment atmosphere through the gate valves, thereby reducing potential offsite dose below the values specified by 10 CFR 100 limits following the postulated accident. The Catawba UFSAR Section 6.2.4, Containment Isolation System, provides additional information concerning the Catawba Containment Valve Injection Water System. The mechanical components, component functions, and materials of construction for the Catawba Containment Valve Injection Water System are listed in Table 3.2-5.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Containment Valve Injection Water System:

CN-1569-1.0	CN-1573-1.3	CN-2563-1.0
CN-2569-1.0	CN-1574-2.0	CN-2565-2.0
CN-1553-1.1	CN-1574-2.2	CN-2565-2.1
CN-1554-1.0	CN-1574-2.4	CN-2565-2.4
CN-1562-1.2	CN-1574-2.8	CN-2565-2.6
CN-1562-1.3	CN-1599-2.1	CN-2573-1.3
CN-1563-1.0	CN-1599-2.2	CN-2574-2.0
CN-1565-2.0	CN-2553-1.1	CN-2574-2.2
CN-1565-2.1	CN-2554-1.0	CN-2574-2.4
CN-1565-2.4	CN-2562-1.2	CN-2574-2.7
CN-1565-2.6	CN-2562-1.3	

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.6 Refueling Water System

McGuire Nuclear Station – The Refueling Water System provides a source of borated water to be used during refueling, for the Emergency Core Cooling System to mitigate the consequences of a FSAR Chapter 15 accident or as borated makeup water for the spent fuel pool. The system can remove impurities from the refueling cavity and transfer canal during refueling, and it can clean up the Refueling Water Storage Tank 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% 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. The McGuire UFSAR Section 9.2.5, Refueling Water System, provides additional information concerning the McGuire Refueling Water System. The mechanical components, component Table 3.2-6.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Refueling Water System:

MCFD-1554-03.00	MCFD-1563-01.00	MCFD-2561-01.00
MCFD-1554-03.01	MCFD-1571-01.00	MCFD-2562-03.00
MCFD-1561-01.00	MCFD-2554-03.00	MCFD-2563-01.00
MCFD-1562-03.00	MCFD-2554-03.01	MCFD-2571-01.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Refueling Water System provides an adequate supply of borated water to the Emergency Core Cooling System and Containment Spray System in order to mitigate the consequences of a Design Basis Event. The Refueling Water System, along with the Safety Injection System, Residual Heat Removal System, and Chemical and Volume Control System function together to form the Emergency Core Cooling System. The Catawba UFSAR Section 9.2.7, Refueling Water System, provides additional information concerning the Catawba Refueling Water System. The mechanical components, component functions, and materials of construction for the Catawba Refueling Water System are listed in Table 3.2-6.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Refueling Water System:

CN-1554-1.2	CN-1570-1.0	CN-2562-1.2
CN-1554-1.7	CN-1571-1.0	CN-2563-1.0
CN-1561-1.0	CN-2554-1.2	CN-2570-1.0
CN-1562-1.2	CN-2554-1.7	CN-2571-1.0
CN-1563-1.0	CN-2561-1.0	

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.7 Residual Heat Removal System

McGuire Nuclear Station – The Residual Heat Removal 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 Residual Heat Removal 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. The McGuire UFSAR Section 6.3, Emergency Core Cooling System, provides additional information concerning the McGuire Residual Heat Removal System. The mechanical components, component functions, and materials of construction for the McGuire Residual Heat Removal System are listed in Table 3.2-7.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Residual Heat Removal System:

MCFD-1561-01.00	MCFD-1571-01.00	MCFD-2562-03.00
MCFD-1554-01.02	MCFD-1572-01.00	MCFD-2562-03.01
MCFD-1554-02.00	MCFD-2561-01.00	MCFD-2563-01.00
MCFD-1562-03.00	MCFD-2554-01.02	MCFD-2571-01.00
MCFD-1562-03.01	MCFD-2554-02.00	MCFD-2572-01.00
MCFD-1563-01.00		

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Residual Heat Removal 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 Residual Heat Removal System also serves as part of the Emergency Core Cooling System during the injection and recirculation phases of Design Basis Events. The Residual Heat Removal System has several secondary functions which includes 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 Catawba UFSAR Section 6.3, Emergency Core Cooling System, provides additional information concerning the Catawba Residual Heat Removal System. The mechanical components, component functions, and materials of construction for the Catawba Residual Heat Removal System are listed in Table 3.2-7.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Residual Heat Removal System:

CN-1561-1.0	CN-1563-1.0	CN-2554-1.6
CN-1561-1.1	CN-1571-1.0	CN-2562-1.2
CN-1554-1.0	CN-1572-1.0	CN-2562-1.3
CN-1554-1.6	CN-2561-1.0	CN-2563-1.0
CN-1562-1.2	CN-2561-1.1	CN-2571-1.0
CN-1562-1.3	CN-2554-1.0	CN-2572-1.0

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.8 Safety Injection System

McGuire Nuclear Station – The Safety Injection System constitutes a major portion of the Emergency Core Cooling System. Along with the Residual Heat Removal, Chemical and Volume Control and Refueling Water Systems, the Safety Injection System 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 Safety Injection System supports each of these functions. The McGuire UFSAR Section 6.3, Emergency Core Cooling System, provides additional information concerning the McGuire Safety Injection System. The mechanical components, component functions, and materials of construction for the McGuire Safety Injection System are listed in Table 3.2-8.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Safety Injection System:

MCFD-1562-01.00	MCFD-1562-03.01	MCFD-2562-02.01
MCFD-1562-02.00	MCFD-1562-04.00	MCFD-2562-03.00
MCFD-1562-02.01	MCFD-2562-01.00	MCFD-2562-03.01
MCFD-1562-03.00	MCFD-2562-02.00	MCFD-2562-04.00

These flow diagrams are contained in Reference [2.3.2-1].

Catawba Nuclear Station – The Safety Injection System constitutes a major portion of the Emergency Core Cooling System (ECCS). Along with the Residual Heat Removal, Chemical and Volume Control and Refueling Water Systems, the Safety Injection System 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 ECCS are: (1) removing stored (sensible) and fission product decay heat, (2) controlling reactivity, and (3) precluding reactor vessel boron precipitation. The Safety Injection System supports each of these functions. The Catawba UFSAR Section 6.3, Emergency Core Cooling System, provides additional information concerning the Catawba Safety Injection System. The mechanical components, component functions, and materials of construction for the Catawba Safety Injection System are listed in Table 3.2-8.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Safety Injection System:

CN-1562-1.0	CN-1562-1.3	CN-2562-1.2
CN-1562-1.1	CN-2562-1.0	CN-2562-1.3
CN-1562-1.2	CN-2562-1.1	

These flow diagrams are contained in Reference [2.3.2-1].

2.3.2.9 References for Section 2.3.2

2.3.2-1. M. S. Tuckman (Duke) letter dated June 13, 2001 to Document Control Desk (NRC), *License Renewal Evaluation Boundary Drawings.* McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-369, 50-370, 50-413, and 50-414.

2.3.3 AUXILIARY SYSTEMS

The methodology to identify the mechanical systems within the scope of license renewal is described in Section 2.1.1 of this Application. Section 2.1.2.1 contains a description of the methodology to identify the mechanical components that are subject to aging management review.

Systems, structures and components are located in this section consistent with their locations in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (July 1981) except where the internal operating environment or function suggests a more appropriate location within the Application. In these situations, the system, structure or component has been located in the more appropriate section. For example, spent fuel storage racks, cranes, and fire barriers which are normally described within the Chapter 9 of NUREG-0800, are described in Section 2.4, Structures and Structural Components, of this Application because their functions are structural rather than mechanical.

The following mechanical systems are described in Section 2.3.3, Auxiliary Systems, in the sections as indicated:

- Auxiliary Building Ventilation System (Section 2.3.3.1)
- Boron Recycle System (Section 2.3.3.2)
- Building Heating Water System (Section 2.3.3.3)
- Chemical & Volume Control System (Section 2.3.3.4)
- Component Cooling System (Section 2.3.3.5)
- Condenser Circulating Water System (Section 2.3.3.6)
- Containment Ventilation System (Section 2.3.3.7)
- Control Area Ventilation System and Chilled Water Systems (Section 2.3.3.8)
- Conventional Waste Water Treatment (Section 2.3.3.9)
- Diesel Building Ventilation (Section 2.3.3.10)
- Diesel Generator Air Intake and Exhaust System [Footnote 2.3.3-1] (Section 2.3.3.11)
- Diesel Generator Cooling Water System [Footnote 2.3.3-1] (Section 2.3.3.12)
- Diesel Generator Crankcase Vacuum System [Footnote 2.3.3-1] (Section 2.3.3.13)
- Diesel Generator Fuel Oil System [Footnote 2.3.3-1] (Section 2.3.3.14)
- Diesel Generator Lube Oil System [Footnote 2.3.3-1] (Section 2.3.3.15)
- Diesel Generator Room Sump Pump (Section 2.3.3.16)
- Diesel Generator Starting Air System [Footnote 2.3.3-1] (Section 2.3.3.17)
- Drinking Water System (Section 2.3.3.18)

2.3.3-1. Catawba Nuclear Station system designations include "Engine" in these system names (See Table 2.2-2). Hereafter, either system name may be used for Catawba.

- Fire Protection System (Section 2.3.3.19)
- Fuel Handling Area Ventilation System (Section 2.3.3.20)
- Fuel Handling Building Ventilation System (Section 2.3.3.20)
- Groundwater Drainage System (Section 2.3.3.21)
- Heating Water System (Section 2.3.3.3)
- Hydrogen Bulk Storage System (Section 2.3.3.22)
- Instrument Air System (Section 2.3.3.23)
- Liquid Radwaste System (Section 2.3.3.24)
- Liquid Waste Recycle System (Section 2.3.3.24)
- Liquid Waste Monitor and Disposal System (Section 2.3.3.24)
- Miscellaneous Structures Ventilation System (Section 2.3.3.25)
- Nitrogen System (Section 2.3.3.26)
- Nuclear Sampling System (Section 2.3.3.27)
- Nuclear Service Water System (Section 2.3.3.28)
- Nuclear Service Water Pump Structure Ventilation System (Section 2.3.3.29)
- Nuclear Solid Waste Disposal System (Section 2.3.3.30)
- Reactor Coolant Pump Motor Oil Collection Sub-System (Section 2.3.3.31)
- Reactor Coolant System (Non-Class 1 Components) (Section 2.3.3.32)
- Recirculated Cooling Water System (Section 2.3.3.33)
- Solid Radwaste System (Section 2.3.3.30)
- Spent Fuel Cooling System (Section 2.3.3.34)
- Standby Shutdown Diesel (Section 2.3.3.35)
- Turbine Building Sump Pump System (Section 2.3.3.36)
- Turbine Building Ventilation System (Section 2.3.3.37)
- Waste Gas System (Section 2.3.3.38)

2.3.3.1 Auxiliary Building Ventilation System

McGuire Nuclear Station – The Auxiliary Building Ventilation System automatically aligns to maintain the Emergency Core Cooling System (ECCS) Pump Rooms at a negative pressure so that air exhausted from these rooms is filtered prior to being released following a Design Basis Accident (DBA). The ECCS Pump Rooms include the Safety Injection Pumps, Residual Heat Removal Pumps, Centrifugal Charging Pumps and Containment Spray Pumps. The McGuire UFSAR Section 9.4.2, Auxiliary Building, provides additional information concerning the McGuire Auxiliary Building Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Auxiliary Building Ventilation System are listed in Table 3.3-1.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Auxiliary Building Ventilation System:

MC-1577-1	MC-1577-5	MC-1577-9
MC-1577-2	MC-1577-8	MC-2577-1
MC-1577-4		

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Auxiliary Building Ventilation System automatically aligns to maintain the Emergency Core Cooling System (ECCS) Pump Rooms at a negative pressure so that air exhausted from these rooms is filtered prior to being released following a Design Basis Accident (DBA). The ECCS Pump Rooms include the Safety Injection Pumps, Residual Heat Removal Pumps, Centrifugal Charging Pumps and Containment Spray Pumps. The Catawba UFSAR Section 9.4.3, Auxiliary Building Ventilation System provides additional information concerning the Catawba Auxiliary Building Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Auxiliary Building Ventilation System are listed in Table 3.3-1.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Auxiliary Building Ventilation System:

CN-1577-1.0	CN-1577-1.3	CN-1577-3.0
CN-1577-1.2	CN-1577-1.8	CN-2577-3.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.2 Boron Recycle System

McGuire Nuclear Station – 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. The McGuire UFSAR Section 9.3.6, Boron Recycle System, provides additional information concerning the McGuire Boron Recycle System. The mechanical components, component functions, and materials of construction for the McGuire Boron Recycle System are listed in Table 3.3-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Boron Recycle System:

MCFD-1554-02.00	MCFD-1556-02.01	MCFD-1567-01.00
MCFD-1556-01.00	MCFD-1556-03.00	MCFD-1567-04.00
MCFD-1556-01.01	MCFD-1565-02.00	MCFD-1595-01.02
MCFD-1556-02.00	MCFD-1565-02.01	MCFD-2556-03.00

These flow diagrams are contained in Reference [2.3.3-1].

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 Catawba UFSAR Section 9.3.5, Boron Recycle System, provides additional information concerning the Catawba Boron Recycle System. The mechanical components, component functions, and materials of construction for the Catawba Boron Recycle System are listed in Table 3.3-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Boron Recycle System:

CN-1554-1.1
CN-1554-1.7
CN-1556-1.0
CN-1556-1.1
CN-1556-1.2
CN-1556-1.3
CN-1556-1.4
CN-1556-1.5
CN-1556-1.6
CN-1556-2.0
CN-1561-1.0
CN-1561-1.1
CN-1562-1.2
CN-1562-1.3
CN-1563-1.0
CN-1565-1.4
CN-1567-1.0
CN-1567-1.3
CN-1595-1.0
CN-2554-1.1
CN-2554-1.2
CN-2554-1.7
CN-2556-2.0
CN-2561-1.0
CN-2561-1.1
CN-2562-1.2
CN-2562-1.3
CN-2563-1.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.3 Building Heating Water System

McGuire Nuclear Station – The Heating Water System provides normal heating requirements of the Auxiliary Building Ventilation System, Fuel Pool Ventilation System, Containment & Incore Instrumentation Room Purge System, Service Building Ventilation System, and the Turbine Building Heating System. The Heating Water System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Heating Water System are listed in Table 3.3-3.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the McGuire Heating Water System:

MCFD-1606-03.02

This flow diagram is contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Building Heating Water System supplies hot water to the heating coils of various HVAC units throughout the plant. The Building Heating Water System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Building Heating Water System are listed in Table 3.3-3.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Building Heating Water System:

CN-1606-1.0	CN-1606-1.7	CN-1606-1.9
CN-1606-1.6	CN-1606-1.8	CN-1606-1.10

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.4 Chemical & Volume Control System

McGuire Nuclear Station – The Chemical and Volume Control System is an integral part of the Emergency Core Cooling System (ECCS) 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 (SB and LBLOCAs) and Main Steam Line Breaks. The Chemical and Volume Control System is also used to provide negative reactivity, by boron injection, to the core. The McGuire UFSAR Section 9.3.4, Chemical and Volume Control System, provides additional information concerning the McGuire Chemical and Volume Control System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Chemical and Volume Control System are listed in Table 3.3-4.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Chemical and Volume Control System:

MCFD-1554-01.00	MCFD-1562-01.00	MCFD-2554-03.01
MCFD-1554-01.01	MCFD-1562-03.00	MCFD-2554-04.00
MCFD-1554-01.02	MCFD-1561-01.00	MCFD-2554-05.00
MCFD-1554-01.03	MCFD-1567-02.01	MC-2555-1.0
MCFD-1554-02.00	MCFD-1565-01.00	MC-2555-2.0
MCFD-1554-02.01	MCFD-1572-02.00	MCFD-2562-01.00
MCFD-1554-03.00	MCFD-2554-01.00	MCFD-2562-03.00
MCFD-1554-03.01	MCFD-2554-01.01	MCFD-2561-01.00
MCFD-1554-04.00	MCFD-2554-01.02	MCFD-2565-01.00
MCFD-1554-05.00	MCFD-2554-01.03	MCFD-2572-02.00
MC-1555-1.0	MCFD-2554-02.00	MCFD-2556-03.00
MC-1555-2.0	MCFD-2554-02.01	MCFD-1556-01.00
MCFD-1556-01.01	MCFD-2554-03.00	

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Chemical and Volume Control System is an integral part of the Emergency Core Cooling System (ECCS) 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 (SB and LBLOCAs) and Main Steam Line Breaks. The Chemical and Volume Control System is also used to provide negative reactivity, by boron injection, to the core. The Catawba UFSAR Section 9.3.4, Chemical and Volume Control System provides additional information concerning the Catawba Chemical and Volume Control System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Chemical and Volume Control System are listed in Table 3.3-5.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Chemical and Volume Control System:

CN-1554-1.0	CN-2554-1.3	CN-1567-1.0
CN-1554-1.1	CN-2554-1.4	CN-1567-1.1
CN-1554-1.2	CN-2554-1.5	CN-1567-1.3
CN-1554-1.3	CN-2554-1.6	CN-1570-1.0
CN-1554-1.4	CN-2554-1.7	CN-1572-1.2
CN-1554-1.5	CN-2554-1.8	CN-2555-1.1
CN-1554-1.6	CN-1555-1.1	CN-2561-1.0
CN-1554-1.7	CN-1556-1.0	CN-2562-1.0
CN-1554-1.8	CN-1561-1.0	CN-2562-1.2
CN-2554-1.0	CN-1562-1.0	CN-2570-1.0
CN-2554-1.1	CN-1562-1.2	CN-2572-1.2
CN-2554-1.2		

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.5 Component Cooling System

McGuire Nuclear Station – The Component Cooling System is a closed loop system that maintains cooling to the essential header components as required for plant conditions, maintains an intermediate system pressure boundary between the Reactor Coolant System and the Nuclear Service Water System to prevent potential radioactive release, provides containment isolation, and maintains containment closure for shutdown. The McGuire UFSAR Section 9.2.4, Component Cooling System, provides additional information concerning the McGuire Component Cooling System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Component Cooling System are listed in Table 3.3-6.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Component Cooling System:

MCFD-1573-01.00	MCFD-1573-03.00	MCFD-2573-02.00
MCFD-1573-01.01	MCFD-1573-03.01	MCFD-2573-02.01
MCFD-1573-02.00	MCFD-1573-04.00	MCFD-2573-03.00
MCFD-1573-02.01	MCFD-2573-01.00	MCFD-2573-03.01
MCFD-1573-02.02	MCFD-2573-01.01	MCFD-2573-04.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Component Cooling System is a closed loop system relied upon to maintain cooling to the essential header components as required for plant conditions, maintains an intermediate pressure boundary between the Reactor Coolant System and the Nuclear Service Water System to prevent potential radioactive release, provides Containment isolation, and maintains Containment closure for shutdown. The Catawba UFSAR Section 9.2.2, Component Cooling System, provides additional information concerning the Catawba Component Cooling System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Component Cooling System are listed in Table 3.3-7.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Component Cooling System:

CN-1573-1.0	CN-1573-1.9	CN-2573-1.3
CN-1573-1.1	CN-1573-2.0	CN-2573-1.4
CN-1573-1.2	CN-1573-2.1	CN-2573-1.5
CN-1573-1.3	CN-1573-2.2	CN-2573-1.7
CN-1573-1.4	CN-1573-2.3	CN-2573-2.0
CN-1573-1.5	CN-2573-1.0	CN-2573-2.1
CN-1573-1.6	CN-2573-1.1	CN-2573-2.2
CN-1573-1.7	CN-2573-1.2	CN-2573-2.3

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.6 Condenser Circulating Water System

McGuire Nuclear Station – The Condenser Circulating Water System provides a suction source of water to the turbine-driven auxiliary feedwater pump for events requiring the activation of the Standby Shutdown Facility. The McGuire UFSAR Section 10.4.5, Condenser Circulating Water System, provides additional information concerning the McGuire Condenser Circulating Water System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Condenser Circulating Water System are listed in Table 3.3-8.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Condenser Circulating Water System:

MCFD-1604-01.02	MCFD-2604-01.00	MCFD-2604-01.02

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Condenser Circulating Water System provides a suction source of water to the turbine-driven auxiliary feedwater pump for events requiring the activation of the Standby Shutdown Facility. The Catawba UFSAR Section 10.4.5, Condenser Circulating Water System, provides additional information concerning the Catawba Condenser Circulating Water System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Condenser Circulating Water System are listed in Table 3.3-8.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Condenser Circulating Water System:

CN-1604-1.0	CN-1592-1.0	CN-2604-1.2
CN-1604-1.1	CN-2604-1.0	CN-2604-1.3
CN-1604-1.2	CN-2604-1.1	CN-2592-1.0
CN-1604-1.3		

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.7 Containment Ventilation Systems

McGuire Nuclear Station – The purpose of the Upper and Lower Containment Ventilation Systems is to provide cooling to the upper and lower compartments of Containment during normal operation and shutdown. The Upper and Lower Containment Ventilation Systems contain RTDs that are required for post-accident monitoring in accordance with the EQ Rule. No mechanical components have an intended function; therefore, no aging management review is required. Since instruments are not highlighted on the flow diagrams, no flow diagrams have been marked for these systems.

Catawba Nuclear Station – The corresponding Catawba system does not meet the license renewal scoping criteria.

2.3.3.8 Control Area Ventilation System and Chilled Water Systems

McGuire Nuclear Station – The Control Area Ventilation System and the Control Area Chilled Water Systems combine to form one system to provide the normal and emergency ventilation requirements to the Control Room and Control Room Area. The McGuire UFSAR Section 6.4, Control Area (Habitability) Ventilation System, provides additional information concerning the McGuire Control Area Ventilation System and the Control Area Chilled Water Systems. The mechanical components, component functions, and materials of construction for the McGuire Control Area Ventilation System and the Control Area Chilled Water Systems are listed in Table 3.3-11 and Table 3.3-9, respectively.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Control Area Ventilation System and the Control Area Chilled Water Systems:

MCFD-1577-1.0	MCFD-1578-02.00	MCFD-1618-01.00
MCFD-1578-1.0	MCFD-1578-03.00	MCFD-1618-02.00
MCFD-1578-1.1	MCFD-1578-04.00	MCFD-1618-04.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Control Room Area Ventilation System and Control Area Chilled Water System combine to form one system whose purpose is to provide the normal and emergency ventilation requirements to the Control Room and Control Room Area. The Catawba UFSAR, Section 9.4.1, Control Room Area Ventilation, provides additional information concerning the Catawba Control Room Area Ventilation and Control Area Chilled Water Systems. The mechanical components, component functions, and materials of construction for the Catawba Control Room Area Ventilation and Control Area Chilled Water Systems are listed in Table 3.3-11 and Table 3.3-10, respectively.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Control Room Area Ventilation and Control Area Chilled Water Systems:

CN-1578-1.0	CN-1578-2.0	CN-1578-2.3
CN-1578-1.1	CN-1578-2.1	CN-1578-2.4
CN-1578-1.2	CN-1578-2.2	CN-1578-2.5
CN-1578-1.3		

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.9 Conventional Waste Water Treatment System

McGuire Nuclear Station – The Conventional Waste Water Treatment System maintains low water level in the Standby Shutdown Facility (SSF) sump to prevent flooding of SSF equipment. The McGuire UFSAR Section 9.2.8, Conventional Waste Water Treatment System, provides additional information concerning the McGuire Conventional Waste Water Treatment System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Conventional Waste Water Treatment System are listed in Table 3.3-12.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the McGuire Conventional Wastewater Treatment System:

MCFD-1583-01.00

This flow diagram is contained in Reference [2.3.3-1].

Catawba Nuclear Station – No system corresponding to the McGuire Conventional Waste Water Treatment System is within the scope of license renewal at Catawba. The SSF sump pump, specifically credited at McGuire, does not meet the license renewal scoping criteria at Catawba.

2.3.3.10 Diesel Building Ventilation System

McGuire Nuclear Station – The Diesel Building Ventilation System maintains temperature control for each Diesel Building when its associated diesel generator is running. The McGuire UFSAR Section 9.4.6, Diesel Building, provides additional information concerning the McGuire Diesel Building Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Building Ventilation System are listed in Table 3.3-13.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Building Ventilation System:

MC-1579-1.0 MC-2579-1.0

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Building Ventilation System maintains temperature control for each Diesel Building when its associated diesel generator is running. The Catawba UFSAR Section 9.4.4, Diesel Building Ventilation System, provides additional information concerning the Catawba Diesel Building Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Building Ventilation System are listed in Table 3.3-13.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Building Ventilation System:

CN-1579-1.0 CN-2579-1.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.11 Diesel Generator Air Intake and Exhaust System

McGuire Nuclear Station – The Diesel Generator Air Intake and Exhaust System supplies sufficient air to the diesel generator engines for fuel consumption and removes exhaust from the diesel generator engines to the atmosphere outside the building. The McGuire UFSAR Section 9.5.11, Diesel Generator Air Intake and Exhaust System, provides additional information concerning the McGuire Diesel Generator Air Intake and Exhaust System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Air Intake and Exhaust System are listed in Table 3.3-14.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Air Intake and Exhaust System:

MCFD-1609-05.00 MCFD-2609-05.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Engine Air Intake and Exhaust System supplies sufficient air to the diesel generator engines for fuel consumption and removes exhaust from the diesel generator engines to the atmosphere outside the building. The Catawba UFSAR Section 9.5.8, Diesel Generator Air Intake and Exhaust System, provides additional information concerning the Catawba Diesel Generator Engine Air Intake and Exhaust System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Engine Air Intake and Exhaust System are listed in Table 3.3-14.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Engine Air Intake and Exhaust System:

CN-1609-5.0 CN-2609-5.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.12 Diesel Generator Cooling Water System

McGuire Nuclear Station – The Diesel Generator Cooling Water System maintains the temperature of each emergency diesel generator engine and support systems within a required operating range. The McGuire UFSAR Section 9.5.5, Diesel Generator Cooling Water System, provides additional information concerning the McGuire Diesel Generator Cooling Water System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Cooling Water System are listed in Table 3.3-15.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Cooling Water System:

MCFD-1609-01.00	MCFD-1609-07.00	MCFD-2609-01.01
MCFD-1609-01.01	MCFD-2609-01.00	MCFD-2609-07.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Engine Cooling Water System maintains the temperature of each emergency diesel generator engine and support systems within a required operating range. The Catawba UFSAR Section 9.5.5, Diesel Generator Engine Cooling Water, provides additional information concerning the Catawba Diesel Generator Engine Cooling Water System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Engine Cooling Water System are listed in Table 3.3-16.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Engine Cooling Water System:

CN-1609-1.0	CN-2609-1.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.13 Diesel Generator Crankcase Vacuum System

McGuire Nuclear Station – The Diesel Generator Crankcase Vacuum System purges the diesel engine crankcase to reduce the concentration of combustible gases. The McGuire UFSAR Section 9.5.9, Diesel Generator Crankcase Vacuum System, provides additional information concerning the McGuire Diesel Generator Crankcase Vacuum System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Crankcase Vacuum System are listed in Table 3.3-17.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Crankcase Vacuum System:

MCFD-1609-06.00 MCFD-2609-06.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Engine Crankcase Vacuum System purges the diesel engine crankcase to reduce the concentration of combustible gases. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Engine Crankcase Vacuum System are listed in Table 3.3-17.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Engine Crankcase Vacuum System:

CN-1609-6.0 CN-2609-6.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.14 Diesel Generator Fuel Oil System

McGuire Nuclear Station – The Diesel Generator Fuel Oil System is relied upon to maintain two trains of fuel oil storage and supply for the Emergency Diesel Generators for a period of operation of no less than five days. The McGuire UFSAR Section 9.5.4, Diesel Generator Fuel Oil System, provides additional information concerning the McGuire Diesel Generator Fuel Oil System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Fuel Oil System are listed in Table 3.3-18.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Fuel Oil System:

MCFD-1609-03.00	MCFD-2609-03.00
MCFD-1609-03.01	MCFD-2609-03.01

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Engine Fuel Oil System is relied upon to maintain two trains of fuel oil storage and supply for the Emergency Diesel Generators for a period of operation of no less than seven days. The Catawba UFSAR Section 9.5.4, Diesel Generator Engine Fuel Oil System, provides additional information concerning the Catawba Diesel Generator Engine Fuel Oil System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Engine Fuel Oil System are listed in Table 3.3-19.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Engine Fuel Oil System:

CN-1609-3.0	CN-2609-3.0
CN-1609-3.1	CN-2609-3.1

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.15 Diesel Generator Lube Oil System

McGuire Nuclear Station – The Diesel Generator Lube Oil System supplies lubricating oil to the diesel engine and its bearings, crankshaft, thrust faces, and other friction surfaces during both standby mode and operation mode of the diesel generator. The McGuire UFSAR Section 9.5.7, Diesel Generator Lubricating Oil System, provides additional information concerning the McGuire Diesel Generator Lube Oil System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Lube Oil System are listed in Table 3.3-20.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Engine Lube Oil System:

MCFD-1609-02.00	MCFD-2609-02.00
MCFD-1609-02.01	MCFD-2609-02.01

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Engine Lube Oil System supplies lubricating oil to the diesel engine and its bearings, crankshaft, thrust faces, and other friction surfaces during both standby mode and operation mode of the diesel generator. The Catawba UFSAR Section 9.5.7, Diesel Generator Engine Lube Oil System, provides additional information concerning the Catawba Diesel Generator Engine Lube Oil System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Engine Lube Oil System are listed in Table 3.3-21.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Engine Lube Oil System:

CN-1609-2.0	CN-2609-2.0
CN-1609-2.2	CN-2609-2.2

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.16 Diesel Generator Room Sump Pump System

McGuire Nuclear Station – The Diesel Generator Room Sump Pump System removes leakage from equipment drains in the Diesel Building and protects the diesel generators from flooding due to a Nuclear Service Water System pipe rupture in one of the diesel rooms acting simultaneously with a turbine building flood. The McGuire UFSAR Section 9.5.10, Diesel Generator Room Sump Pump System, provides additional information concerning the McGuire Diesel Generator Room Sump Pump System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Room Sump Pump System are listed in Table 3.3-22.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Room Sump Pump System:

MCFD-1609-01.00	MCFD-2609-01.00	MCFD-2609-07.00
MCFD-1609-07.00	MCFD-2609-01.01	

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Room Sump Pump System removes normal leakage and drainage from various equipment in the diesel generator rooms. The Catawba UFSAR Section 9.5.9, Diesel Generator Room Sump Pump System, provides additional information concerning the Catawba Diesel Generator Room Sump Pump System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Room Sump Pump System are listed in Table 3.3-22.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Room Sump Pump System:

CN-1609-7.0	CN-2609-7.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.17 Diesel Generator Starting Air System

McGuire Nuclear Station – The Diesel Generator Starting Air System provides fast start capability for the emergency diesel engine by using compressed air to roll the engine until it starts. The Diesel Generator Starting Air System also supplies air to the diesel controls to operate and shutdown the engine. The McGuire UFSAR Section 9.5.6, Diesel Generator Starting Air System, provides additional information concerning the McGuire Diesel Generator Starting Air System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Diesel Generator Starting Air System are listed in Table 3.3-23.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Diesel Generator Starting Air System:

MCFD-1609-04.00	MCID-1499-VG.03
MCFD-2609-04.00	MCID-2499-VG.03

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Diesel Generator Engine Starting Air System provides fast start capability for the emergency diesel engine by using compressed air to roll the engine until it starts. The Diesel Generator Engine Starting Air System also supplies air to the diesel controls to operate and shutdown the engine. The Catawba UFSAR Section 9.5.6, Diesel Generator Engine Starting Air System, provides additional information concerning the Catawba Diesel Generator Engine Starting Air System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Diesel Generator Engine Starting Air System are listed in Table 3.3-24.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Diesel Generator Engine Starting Air System:

CN-1609-4.0	CN-2609-4.0
CN-1609-4.1	CN-2609-4.1

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.18 Drinking Water System

McGuire Nuclear Station – No portion of the McGuire Drinking Water System is within the scope of license renewal. Only the Duke Class F portions of the Drinking Water System are in scope at Catawba. McGuire has no Class F components in the Drinking Water System.

Catawba Nuclear Station – The Drinking Water System is a municipal water system consisting of a water tower, pumps, and chemical treatment equipment providing chlorinated drinking water to the plant. The Drinking Water System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Drinking Water System are listed in Table 3.3-25.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Drinking Water System:

CN-1601-2.3	CN-1601-2.4

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.19 Fire Protection System

McGuire Nuclear Station – The Interior/Exterior Fire Protection System provides fire suppression to protect the capability to shut down the reactor and maintain it in a safe shutdown condition and to minimize radioactive releases to the environment in the event of a fire. In addition, the system provides water to the condenser circulating water pump and low level intake pump bearings. The McGuire UFSAR Section 9.5.1, Fire Protection System, provides additional information concerning the McGuire Interior/Exterior Fire Protection System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Interior/Exterior Fire Protection System are listed in Table 3.3-26.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Interior/Exterior Fire Protection System:

MCFD-1599-01.00	MCFD-1599-02.03	MCFD-2599-04.00
MCFD-1599-02.01	MCFD-1599-03.00	MCFD-1604-01.00
MCFD-1599-02.02	MCFD-1599-04.00	

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Interior/Exterior Fire Protection System provides fire suppression to protect the capability to shut down the reactor and maintain it in a safe shutdown condition and to minimize radioactive releases to the environment in the event of a fire. The Catawba UFSAR Section 9.5.1, Fire Protection System provides additional information concerning the Catawba Interior/Exterior Fire Protection System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Interior/Exterior Fire Protection System are listed in Table 3.3-27.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Interior/Exterior Fire Protection System:

CN-1599-1.0	CN-1599-2.4	CN-1574-2.1
CN-1599-1.2	CN-1599-4.0	CN-1574-2.5
CN-1599-2.1	CN-1599-4.2	CN-2574-2.1
CN-1599-2.2	CN-2599-4.0	CN-2574-2.5
CN-1599-2.3	CN-2599-4.2	

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.20 Fuel Handling Building Ventilation System

McGuire Nuclear Station – The Fuel Handling Building Ventilation System maintains ventilation in the spent fuel pool of Units 1 and 2 to permit personnel access. The exhaust portion of the Fuel Handling Building Ventilation System controls airborne radioactivity in the fuel pool area during normal operation, anticipated operational transients, and following postulated fuel handling accidents. The McGuire UFSAR Section 9.4.2, Auxiliary Building, provides additional information concerning the McGuire Fuel Handling Building Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Fuel Handling Building Ventilation System are listed in Table 3.3-28.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Fuel Handling Building Ventilation System:

MC-1577-1.0	MC-2577-1.0
MC-1577-3.0	MC-2577-3.0

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Fuel Handling Area Ventilation System maintains ventilation in the spent fuel pool of Units 1 and 2 to permit personnel access. The exhaust portion of the Fuel Handling Area Ventilation System controls airborne radioactivity in the fuel pool area during normal operation, anticipated operational transients, and following postulated fuel handling accidents. The Catawba UFSAR Section 9.4.2, Fuel Building Ventilation System, provides additional information concerning the Catawba Fuel Handling Area Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Fuel Handling Area Ventilation System are listed in Table 3.3-28.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Fuel Handling Area Ventilation System:

CN-1577-2.0	CN-1577-3.0	CN-1577-2.1
CN-2577-2.0	CN-2577-3.0	CN-2577-2.1

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.21 Groundwater Drainage System

McGuire Nuclear Station – The Groundwater Drainage System prevents hydrostatic loads on the Reactor and Auxiliary Building substructures. The Groundwater Drainage System maintains an acceptable groundwater level for the Auxiliary Building by transferring water out of the Auxiliary Building and mitigates the consequences of certain postulated flooding events. The McGuire UFSAR Section 9.5.8, Groundwater Drainage System, provides additional information concerning the McGuire Groundwater Drainage System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Groundwater Drainage System are listed in Table 3.3-29. The structural portions of the Groundwater Drainage System are addressed in Section 2.4.2.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the McGuire Groundwater Drainage System:

MCFD-1581-01.00

This flow diagram is contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Groundwater Drainage System prevents hydrostatic loads on the Reactor and Auxiliary Building substructures. The Groundwater Drainage System maintains an acceptable groundwater level for the Auxiliary Building by transferring water out of the Auxiliary Building and mitigates the consequences of certain postulated flooding events. The Catawba UFSAR Section 9.5.11, Groundwater Drainage System, provides additional information concerning the Catawba Groundwater Drainage System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Groundwater Drainage System are listed in Table 3.3-29. The structural portions of the Groundwater Drainage System are addressed in Section 2.4.2.

The following flow diagram has have been marked to indicate the license renewal evaluation boundary for the Catawba Groundwater Drainage System:

CN-1581-1.0

This flow diagram is contained in Reference [2.3.3-1].

2.3.3.22 Hydrogen Bulk Storage System

McGuire Nuclear Station – The Hydrogen Bulk Storage System supplies hydrogen to the Volume Control Tank (Chemical and Volume Control System). The Hydrogen Bulk Storage System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Hydrogen Bulk Storage System are listed in Table 3.3-30.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Hydrogen Bulk Storage System:

MCFD-1554-02.00	MCFD-1603-01.00	MCFD-2554-02.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Hydrogen Bulk Storage System supplies hydrogen to the Volume Control Tank (Chemical and Volume Control System). The Hydrogen Bulk Storage System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Hydrogen Bulk Storage System are listed in Table 3.3-30.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Hydrogen Bulk Storage System:

CN-1603-1.0	CN-2554-1.1
CN-1554-1.1	CN-1567-1.4

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.23 Instrument Air System

McGuire Nuclear Station – The Instrument Air System provides dry oil-free air for instrumentation, testing, and control air requirements. The McGuire UFSAR Section 9.3.1, Compressed Air Systems, provides additional information concerning the McGuire Instrument Air System. The mechanical components, component functions, and materials of construction for the McGuire Instrument Air System are listed in Table 3.3-31.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Instrument Air System:

MCFD-1605-01.02	MCFD-1593-01.00	MCFD-2605-01.04
MCFD-1605-01.03	MCFD-1593-01.03	MCFD-2605-01.13
MCFD-1605-01.04	MCFD-1602-01.02	MCFD-2605-01.16
MCFD-1605-01.13	MCFD-1609-04.00	MCFD-2553-02.00
MCFD-1605-01.14	MCFD-1605-03.01	MCFD-2562-02.00
MCFD-1605-01.16	MCFD-1605-02.02	MCFD-2609-04.00
MCFD-1605-01.17	MCFD-2605-01.02	MCFD-2605-03.01
MCFD-1553-02.00	MCFD-2605-01.03	MCFD-2605-02.02
MCFD-1562-02.00		

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Instrument Air System supplies clean, oil-free, dried compressed air to all air-operated instrumentation and valves for both units. The Catawba UFSAR Section 9.3.1, Compressed Air System, provides additional information concerning the Catawba Instrument Air System. The mechanical components, component functions, and materials of construction for the Catawba Instrument Air System are listed in Table 3.3-31.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Instrument Air System:

CN-1605-1.4	CN-1562-1.1	CN-2562-1.1
CN-1605-1.14	CN-2605-1.5	

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.24 Liquid Waste System

McGuire Nuclear Station – The Liquid Waste Recycle and Liquid Waste Monitor and Disposal Systems collect, segregate, and process the reactor-grade and non-reactor grade liquid wastes produced during station operation, refueling, or maintenance. Portions of the Liquid Waste Recycle System function as part of the Reactor Coolant System leakage detection systems. The McGuire UFSAR Section 11.2, Liquid Waste System, provides additional information concerning the McGuire Liquid Waste Recycle and Liquid Waste Monitor and Disposal Systems. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Liquid Waste Recycle and Liquid Waste Monitor and Disposal Systems are listed in Table 3.3-32.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Liquid Waste Recycle and Liquid Waste Monitor and Disposal Systems:

MCFD-1565-01.00	MCFD-1565-05.00	MCFD-2565-01.00
MCFD-1565-01.01	MCFD-1565-06.00	MCFD-2565-01.01
MCFD-1565-02.00	MCFD-1565-07.00	MCFD-2565-03.00
MCFD-1565-03.00	MCFD-1595-01.02	MCFD-2565-07.00
MCFD-1565-04.00		

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Liquid Radwaste System collects, segregates, and processes all radioactive and potentially radioactive liquids generated in the plant. In general, all reactor grade liquids are recycled and all non-reactor grade liquids are processed and disposed of in accordance with applicable NRC regulations. The system is designed to control and minimize releases of radioactivity to the environment. The Catawba UFSAR Section 11.2, Liquid Radwaste System, provides additional information concerning the Catawba Liquid Radwaste System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Liquid Radwaste System are listed in Table 3.3-32.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Liquid Radwaste System:

CN-1556-1.0	CN-1565-2.0	CN-2565-2.1
CN-1565-1.0	CN-1565-2.1	CN-2565-2.2
CN-1565-1.1	CN-1565-2.2	CN-2565-2.4
CN-1565-1.4	CN-1565-2.4	CN-2565-2.5
CN-1565-1.5	CN-1565-2.5	CN-2565-2.6
CN-1565-1.7	CN-1565-2.6	CN-1604-2.0
CN-1565-1.8	CN-1567-1.0	CN-2604-2.0
CN-1565-1.9	CN-2565-2.0	CN-1566-1.2

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.25 Miscellaneous Structures Ventilation System

McGuire Nuclear Station – The Turbine Building Ventilation System at McGuire performs the corresponding functions as the Miscellaneous Structures Ventilation System at Catawba. See Section 2.3.3.37 for the McGuire Turbine Building Ventilation System.

Catawba Nuclear Station – The Catawba Miscellaneous Structures Ventilation System includes the Standby Shutdown Facility (SSF) HVAC. The SSF HVAC portion of the Miscellaneous Structures Ventilation System provides the environmental controls necessary to ensure that SSF equipment is maintained operable during postulated fires and station blackout. The mechanical components subject to aging management review, their intended functions, and materials of construction for the SSF HVAC portion of the Catawba Miscellaneous Structures Ventilation System are listed in Table 3.3-33.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the SSF HVAC portion of the Catawba Miscellaneous Structures Ventilation System:

CN-1579-4.3

This flow diagram is contained in Reference [2.3.3-1].

2.3.3.26 Nitrogen System

McGuire Nuclear Station – The Nitrogen System provides a safety-related supply of nitrogen to the pneumatic actuators on the feedwater isolation valves. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Nitrogen System are listed in Table 3.3-34.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Nitrogen System:

MCFD-1602-01.02	MCFD-2602-01.00
MCFD-1554-02.00	MCFD-2554-02.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Nitrogen System is a non-safety 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). All components within the seismically designed piping boundaries of this systems are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Nitrogen System are listed in Table 3.3-34.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the Catawba Nitrogen System:

CN-1602-1.0

This flow diagram is contained in Reference [2.3.3-1].

2.3.3.27 Nuclear Sampling System

McGuire Nuclear Station – The Nuclear Sampling System provides a means of obtaining the more frequently taken samples during normal plant operation from the station's nuclear-safety related systems in a convenient, shielded, and safe environment. The system also provides a means of sampling the Reactor Coolant and Containment atmosphere following a loss-of-coolant-accident (LOCA) to monitor the reactor and determine the degree of core damage. The McGuire UFSAR Section 9.3.2, Nuclear Sampling System, provides additional information concerning the McGuire Nuclear Sampling System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Nuclear Sampling System are listed in Table 3.3-35.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Nuclear Sampling System:

MCFD-1572-01.00	MCFD-1572-02.00	MCFD-2554-02.00
MCFD-1553-02.00	MCFD-1572-03.00	MCFD-2562-02.00
MCFD-1553-01.00	MCFD-1580-01.00	MCFD-2562-02.01
MCFD-1572-01.01	MCFD-2572-01.00	MCFD-2572-02.00
MCFD-1554-02.00	MCFD-2553-02.00	MCFD-2572-03.00
MCFD-1562-02.00	MCFD-2553-01.00	MCFD-2580-01.00
MCFD-1562-02.01	MCFD-2572-01.01	

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Nuclear Sampling System provides a means of obtaining the more frequently taken samples during normal plant operation from the station's nuclear-safety related systems in a convenient, shielded, and safe environment. The system also provides a means of sampling the Reactor Coolant and Containment atmosphere following a loss-of-coolant-accident (LOCA) to monitor the reactor and determine the degree of core damage. The Catawba UFSAR Section 9.3.2, Process Sampling and Post-Accident Sampling Systems, provides additional information concerning the Catawba Nuclear Sampling System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Nuclear Sampling System are listed in Table 3.3-35.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Nuclear Sampling System:

CN-1572-01.00	CN-1572-01.02	CN-2572-01.01
CN-1553-01.00	CN-1572-01.04	CN-2554-01.01
CN-1553-01.01	CN-1580-01.00	CN-2562-01.01
CN-1572-01.01	CN-2572-01.00	CN-2572-01.02
CN-1554-01.01	CN-2553-01.00	CN-2572-01.04
CN-1562-01.01	CN-2553-01.01	CN-2580-01.00

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.28 Nuclear Service Water System

McGuire Nuclear Station – The Nuclear Service Water System provides cooling water from Lake Norman or the Standby Nuclear Service Water Pond to various safety-related and non-safety related heat exchangers. In addition, the system acts as an assured source of makeup water for various requirements and the normal supply of water for the Containment Ventilation Cooling Water System. The McGuire UFSAR Section 9.2.2, Nuclear Service Water System and Ultimate Heat Sink, provides additional information concerning the McGuire Nuclear Service Water System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Nuclear Service Water System are listed in Table 3.3-36.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Nuclear Service Water System:

MCFD-1570-01.01	MCFD-1592-01.01	MCFD-2574-03.00
MCFD-1573-01.01	MCFD-1604-03.00	MCFD-2574-03.01
MCFD-1574-01.00	MCFD-1609-01.00	MCFD-2574-04.00
MCFD-1574-01.01	MCFD-1609-01.01	MCFD-2592-01.01
MCFD-1574-02.00	MCFD-2570-01.01	MCFD-2604-03.00
MCFD-1574-02.01	MCFD-2573-01.01	MCFD-2604-03.01
MCFD-1574-03.00	MCFD-2574-01.01	MCFD-2609-01.00
MCFD-1574-03.01	MCFD-2574-02.00	MCFD-2609-01.01
MCFD-1574-04.00	MCFD-2574-02.01	MCFD-1604-01.02
MCFD-1581-01.00		

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Nuclear Service Water System, along with Lake Wylie and the Standby Nuclear Service Water Pond, provides the ultimate heat sink for various safety-related heat loads during normal operation and design basis events. The Nuclear Service Water System also supplies emergency makeup water to various safety-related systems during postulated design basis events, water for fire protection hose stations in the diesel buildings and Nuclear Service Water Pumphouse, and cooling flow and flush water for non-QA heat loads and functions during normal operation. The Catawba UFSAR Section 9.2.1, Nuclear Service Water System, provides additional information concerning the Catawba Nuclear Service Water System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Nuclear Service Water System are listed in Table 3.3-37.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Nuclear Service Water System:

CN-1565-1.3	CN-1574-1.4	CN-2573-1.1
CN-1565-1.10	CN-1574-1.5	CN-2573-2.2
CN-1570-1.0	CN-1574-2.0	CN-2573-2.3
CN-1573-1.1	CN-1574-2.1	CN-2574-2.0
CN-1573-2.2	CN-1574-2.2	CN-2574-2.1
CN-1573-2.3	CN-1574-2.4	CN-2574-2.2
CN-1574-1.0	CN-1574-2.5	CN-2574-2.4
CN-1574-1.1	CN-1574-2.8	CN-2574-2.5
CN-1574-1.2	CN-2570-1.0	CN-2574-2.7

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.29 Nuclear Service Water Pump Structure Ventilation System

McGuire Nuclear Station – No system corresponding to the Catawba Nuclear Service Water Pump Structure Ventilation System exists at McGuire. McGuire has no Nuclear Service Water Pump Structure.

Catawba Nuclear Station – The Nuclear Service Water Pump Structure Ventilation System creates and maintains a suitable environmental temperature for the operation of equipment located in the Nuclear Service Water Pump Structure. The Catawba UFSAR Section 9.4.8, Nuclear Service Water Pump Structure Ventilation System, provides additional information concerning the Catawba Nuclear Service Water Pump Structure Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Nuclear Service Water Pump Structure Ventilation System are listed in Table 3.3-38.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the Catawba Nuclear Service Water Pump Structure Ventilation System:

CN-1557-2.0

This flow diagram is contained in Reference [2.3.3-1].

2.3.3.30 Nuclear Solid Waste Disposal System

McGuire Nuclear Station – The Nuclear Solid Waste Disposal System is relied upon to contain solid radioactive waste materials as they are produced in the station. The McGuire UFSAR Section 11.5, Nuclear Solid Waste Disposal System, provides additional information concerning the McGuire Nuclear Solid Waste Disposal System. The mechanical components, component functions, and materials of construction for the McGuire Nuclear Solid Waste Disposal System are listed in Table 3.3-39.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the McGuire Nuclear Solid Waste Disposal System:

MCFD-1566-01.00

This flow diagram is contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Solid Radwaste System provides capacity to contain and store radioactive waste materials as they are produced in the station and prepares the waste for eventual shipment to a licensed offsite disposal facility. The Solid Radwaste System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components, component functions, and materials of construction for the Catawba Solid Radwaste System are listed in Table 3.3-39.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the Catawba Solid Radwaste System:

CN-1566-1.2

This flow diagram is contained in Reference [2.3.3-1].

2.3.3.31 Reactor Coolant Pump Motor Oil Collection Sub-System

McGuire Nuclear Station – Each reactor coolant pump motor at McGuire Nuclear Station is equipped with an oil collection system that contains any oil leakage that meets the requirements of 10 CFR 50, Appendix R, Section III.O. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Reactor Coolant Pump Motor Oil Collection Sub-System are listed in Table 3.3-40.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Reactor Coolant Pump Motor Oil Collection Sub-System:

MCFD-1553-04.00 MCFD-2553-04.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – Each reactor coolant pump motor at Catawba Nuclear Station is equipped with an oil collection system that contains any oil leakage that meets the requirements of 10 CFR 50, Appendix R, Section III.O. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Reactor Coolant Pump Motor Oil Collection Sub-System are listed in Table 3.3-40.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Reactor Coolant Pump Motor Oil Collection Sub-System:

CN-1553-1.3 CN-2553-1.3

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.32 Reactor Coolant System (Non-Class 1 Components)

McGuire Nuclear Station – The non-Class 1 portions of the Reactor Coolant System (excluding the RCP motor oil collection sub-system) are relied upon to provide and maintain Containment isolation and closure and maintain system pressure boundary integrity. The reactor vessel leak-off line is included within this set of components and is relied upon only in the event the reactor vessel flange inner seal leaks. The mechanical components subject to aging management review, their intended functions, and materials of construction for the non-Class 1 portions of the McGuire Reactor Coolant System are listed in Table 3.3-41.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the non-Class 1 portions of the McGuire Reactor Coolant System:

MCFD-1553-01.00	MCFD-1562-03.01	MCFD-2554-03.01
MCFD-1553-02.00	MCFD-1563-01.00	MCFD-2561-01.00
MCFD-1553-02.01	MCFD-1567-02.01	MCFD-2562-03.00
MCFD-1554-03.01	MCFD-2553-01.00	MCFD-2562-03.01
MCFD-1561-01.00	MCFD-2553-02.00	MCFD-2563-01.00
MCFD-1562-03.00	MCFD-2553-02.01	

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The non-Class 1 portions of the Reactor Coolant System (excluding the RCP motor oil collection sub-system) are relied upon to provide and maintain Containment isolation and closure and maintain system pressure boundary integrity. The reactor vessel leak-off line is included within this set of components and is relied upon only in the event the reactor vessel flange inner seal leaks. The mechanical components subject to aging management review, their intended functions, and materials of construction for the non-Class 1 portions of the Catawba Reactor Coolant System are listed in Table 3.3-41.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the non-Class 1 portions of the Catawba Reactor Coolant System:

CN-1553-1.0	CN-1567-1.1	CN-2553-1.1
CN-1553-1.1	CN-2553-1.0	CN-2553-1.2
CN-1553-1.2		

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.33 Recirculated Cooling Water System

McGuire Nuclear Station – No portion of the McGuire Recirculated Cooling Water System is within the scope of license renewal. Only the Duke Class F portions of the Recirculated Cooling Water System are in scope at Catawba. McGuire has no Class F components in the Recirculated Cooling Water System.

Catawba Nuclear Station – The Recirculated Cooling Water System is a closed cooling system that delivers clean, rust-inhibited cooling water of a regulated temperature to various equipment in the Turbine Buildings, Auxiliary Building, and Service Building. The Recirculated Cooling Water System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Recirculated Cooling Water System are listed in Table 3.3-42.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the Catawba Recirculated Cooling Water System:

CN-1600-1.1

This flow diagram is contained in Reference [2.3.3-1].

2.3.3.34 Spent Fuel Cooling System

McGuire Nuclear Station – The Spent Fuel Cooling System removes heat from the spent fuel pool and maintains the purity and optical clarity of the pool water for fuel handling operations. The purification loop provides an alternate means for removing impurities from either the refueling canal/transfer canal water during refueling or the refueling water storage tank water following refueling. The fuel pool water also serves as a source of makeup water to the Reactor Coolant System during a Standby Shutdown System event. The McGuire UFSAR Section 9.1.3, Spent Fuel Cooling and Purification, provides additional information concerning the McGuire Spent Fuel Cooling System. The mechanical components, component functions, and materials of construction for the McGuire Spent Fuel Cooling System are listed in Table 3.3-43.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Spent Fuel Cooling System:

MCFD-1570-01.00	MCFD-1571-01.00	MCFD-2570-01.01
MCFD-1570-01.01	MCFD-2570-01.00	MCFD-2571-01.00

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Spent Fuel Cooling System, in conjunction with the Component Cooling Water system and Nuclear Service Water system, is designed to remove heat from the Spent Fuel Pool and maintain purity and optical clarity of the pool water during fuel handling operations. The purification loop provides an alternate means for removing impurities from either the refueling cavity/transfer canal water during refueling or the Refueling Water Storage Tank water following refueling. The Catawba UFSAR Section 9.1.3, Spent Fuel Cooling and Purification, provides additional information concerning the Catawba Spent Fuel Cooling System. The mechanical components, component functions, and materials of construction for the Catawba Spent Fuel Cooling System are listed in Table 3.3-43.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Spent Fuel Cooling System:

CN-1554-1.8	CN-1570-1.1	CN-2570-1.0
CN-1570-1.0	CN-2554-1.8	CN-2570-1.1

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.35 Standby Shutdown Diesel

McGuire Nuclear Station – The Standby Shutdown Diesel System provides an alternate and independent means of achieving and maintaining a Hot Standby condition for one or both units following a postulated fire event. The diesel provides power to the standby shutdown facility required components, instrumentation, and controls for a period of up to 72 hours. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Standby Shutdown Diesel System are listed in Table 3.3-44.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Standby Shutdown Diesel System:

MCFD-1560-01.00	MCFD-1560-02.00	MC-1614-4

These flow diagrams are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Standby Shutdown Diesel System provides an alternate and independent means of achieving and maintaining a Hot Standby condition for one or both units following a postulated fire event. The diesel provides power to the standby shutdown facility required components, instrumentation, and controls for a period of up to 72 hours. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Standby Shutdown Diesel System are listed in Table 3.3-44.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Standby Shutdown Diesel System:

CN-1560-1.0	CN-1560-2.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.36 Turbine Building Sump Pump System

McGuire Nuclear Station – No portion of the McGuire Turbine Building Sump Pump System is within the scope of license renewal. Only the Duke Class F portions of the Turbine Building Sump Pump System are in scope at Catawba. McGuire has no Class F components in the Turbine Building Sump Pump System.

Catawba Nuclear Station – The Turbine Building Sump Pump System serves as a collection point for the contents of Liquid Radwaste System sumps when the contents of the sumps contain less than predetermined levels of radiation, as sensed by radiation monitors in the discharge lines. The Turbine Building Sump Pump System is a non-safety 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). All components within the seismically designed piping boundaries of this systems are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Turbine Building Sump Pump System are listed in Table 3.3-45.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Turbine Building Sump Pump System:

CN-1604-2.0 CN-2604-2.0

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.37 Turbine Building Ventilation System

McGuire Nuclear Station – The Turbine Building Ventilation System includes the HVAC system in the Standby Shutdown Facility (SSF), of which a portion is entitled Standby Shutdown Facility HVAC System. The SSF HVAC portion of the Turbine Building Ventilation System provides the heating, ventilation and air conditioning requirements for the SSF and consists of air conditioning and ventilation subsystems. The McGuire UFSAR Section 9.4.4, Turbine Building, provides additional information concerning the SSF HVAC portion of the McGuire Turbine Building Ventilation System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the SSF HVAC portion of the McGuire Turbine Building Ventilation System are listed in Table 3.3-46.

The following flow diagram has been marked to indicate the license renewal evaluation boundary for the SSF HVAC portion of the McGuire Turbine Building Ventilation System:

MC-1614-4

This flow diagram is contained in Reference [2.3.3-1].

Catawba Nuclear Station – No portion of the Catawba Turbine Building Ventilation System is within the scope of license renewal. The Catawba Miscellaneous Structures Ventilation System that provides SSF HVAC is addressed in Section 2.3.3.25.

2.3.3.38 Waste Gas System

McGuire Nuclear Station – The Waste Gas System removes fission gases from radioactive contaminated fluids and contains these gases in holdup tanks indefinitely. Storage and subsequent decay of these gases eliminates the need for regularly scheduled discharge of these radioactive gases from the system into the atmosphere during normal plant operation. The McGuire UFSAR Section 11.3, Waste Gas System, provides additional information concerning the McGuire Waste Gas System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Waste Gas System are listed in Table 3.3-47.

The following is a list of the flow diagrams and instrument details that have been marked to indicate the license renewal evaluation boundary for the McGuire Waste Gas System:

MCFD-1567-01.00	MCFD-1567-04.00	MCFD-2554-03.00
MCFD-1567-02.00	MCFD-1554-02.00	MCFD-1556-02.01
MCFD-1567-02.01	MCFD-1554-03.00	MCFD-1565-06.00
MCFD-1567-03.00	MCFD-2554-02.00	MCID-1499-WG.28
MCFD-1567-03.01		

These flow diagrams and instrument details are contained in Reference [2.3.3-1].

Catawba Nuclear Station – The Waste Gas System removes fission product gases from radioactive fluids and contains these gases for a time sufficient to allow ample decay of the nuclides prior to release in accordance with applicable NRC regulations. The system is designed to control and minimize releases of radioactive effluent to the environment by reducing the fission product gas concentration in the reactor coolant which may escape during maintenance operations or from equipment leaks. The Catawba UFSAR Section 11.3, Waste Gas System, provides additional information concerning the Catawba Waste Gas System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Waste Gas System are listed in Table 3.3-47.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Waste Gas System:

CN-1567-1.0	CN-1567-1.4	CN-1556-1.2
CN-1567-1.1	CN-1554-1.1	CN-1556-1.3
CN-1567-1.2	CN-2554-1.1	CN-1565-1.5
CN-1567-1.3		

These flow diagrams are contained in Reference [2.3.3-1].

2.3.3.39 References for Section 2.3.3

2.3.3-1. M. S. Tuckman (Duke) letter dated June 13, 2001 to Document Control Desk (NRC), *License Renewal Evaluation Boundary Drawings.* McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-369, 50-370, 50-413, and 50-414.

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The methodology to identify the mechanical systems within the scope of license renewal is described in Section 2.1.1 of this Application. Section 2.1.2.1 contains a description of the methodology to identify the mechanical components that are subject to aging management review.

Systems, structures and components are located in this section consistent with their locations in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (July 1981) except where the internal operating environment or function suggests a more appropriate location within the Application. In these situations, the system, structure or component has been located in the more appropriate section. For example, the Condenser Circulating Water System which is normally described within Chapter 10 of NUREG-0800, described in Section 2.3.3, Auxiliary Systems, of this Application because its internal operating environment is raw water.

The following mechanical systems are described in Section 2.3.4, Steam and Power Conversion Systems, in the sections as indicated:

- Auxiliary Feedwater System (Section 2.3.4.1)
- Auxiliary Steam System (Section 2.3.4.2)
- Condensate System (Section 2.3.4.3)
- Condensate Storage System (Section 2.3.4.4)
- Feedwater System (Section 2.3.4.5)
- Feedwater Pump Turbine Exhaust System (Section 2.3.4.6)
- Feedwater Pump Turbine Hydraulic Oil System (Section 2.3.4.7)
- Main Steam Auxiliary Equipment System (Section 2.3.4.9)
- Main Steam System (Section 2.3.4.8)
- Main Steam Supply to Auxiliary Equipment System (Section 2.3.4.9)
- Main Steam Vent to Atmosphere System (Section 2.3.4.10)
- Main Turbine Hydraulic Oil System (Section 2.3.4.11)
- Main Turbine Lube Oil and Purification System (Section 2.3.4.12)
- Turbine Exhaust System (Section 2.3.4.6)

2.3.4.1 Auxiliary Feedwater System

McGuire Nuclear Station – The Auxiliary Feedwater System is a nuclear safety-related system which serves as a backup to the Feedwater System to ensure the safety of the plant and protection of equipment. The Auxiliary Feedwater System is essential to prevent an unacceptable decrease in the steam generator water levels, to reverse the rise in reactor coolant temperature, to prevent the pressurizer from filling to a water solid condition, and to establish stable hot standby conditions. The Auxiliary Feedwater System can be used during an emergency as well as during normal startup and shutdown operations. The McGuire UFSAR Section 10.4.10, Auxiliary Feedwater System, provides additional information concerning the McGuire Auxiliary Feedwater System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Auxiliary Feedwater System are listed in Table 3.4-1.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Auxiliary Feedwater System:

MCFD-1574-02.00	MCFD-1592-01.01	MCFD-2591-01.01
MCFD-1574-03.00	MCFD-1617-01.00	MCFD-2592-01.00
MCFD-1584-01.00	MCFD-2574-02.00	MCFD-2592-01.01
MCFD-1591-01.01	MCFD-2574-03.00	MCFD-2617-01.00
MCFD-1592-01.00	MCFD-2584-01.00	

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Auxiliary Feedwater System is a nuclear safety related system which serves as a backup to the Feedwater System to ensure the safety of the plant and protection of equipment. The Auxiliary Feedwater System is essential to prevent an unacceptable decrease in the steam generator water levels, to reverse the rise in reactor coolant temperature, to prevent the pressurizer from filling to a water solid condition, and to establish stable hot standby conditions. The Auxiliary Feedwater System can be used during an emergency as well as during normal startup and shutdown operations. The Catawba UFSAR Section 10.4.9, Auxiliary Feedwater System, provides additional information concerning the Catawba Auxiliary Feedwater System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Auxiliary Feedwater System are listed in Table 3.4-1.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Auxiliary Feedwater System:

CN-1592-1.0	CN-1584-1.0	CN-2573-2.3
CN-1592-1.1	CN-1591-1.1	CN-2574-2.1
CN-1565-2.2	CN-2592-1.0	CN-2574-2.5
CN-1573-2.2	CN-2592-1.1	CN-2584-1.0
CN-1573-2.3	CN-2565-2.2	CN-2591-1.1
CN-1574-2.1	CN-2573-2.2	CN-1593-1.2
CN-1574-2.5		

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.2 Auxiliary Steam System

McGuire Nuclear Station – The Auxiliary Steam System provides steam to various plant equipment as required during all modes of plant operation, including condensate cleanup, startup, normal operation, and shutdown. The Auxiliary Steam System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Auxiliary Steam System are listed in Table 3.4-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Auxiliary Steam System:

MCFD-1595-1.0	MCFD-2595-1.0	MCFD-2593-1.1
MCFD-1595-1.2	MCFD-1593-1.2	MCFD-1554-5.0

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Auxiliary Steam System provides steam to various plant equipment as required during all modes of plant operation, including condensate cleanup, startup, normal operation, and shutdown. The Auxiliary Steam System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Auxiliary Steam System are listed in Table 3.4-2.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Auxiliary Steam System:

CN-1595-1.0	CN-2595-1.0	CN-2593-1.1
CN-1595-1.2	CN-1593-1.1	

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.3 Condensate System

McGuire Nuclear Station – No portion of the McGuire Condensate System is within the scope of license renewal. Only the Duke Class F portions of the Condensate System are in scope at Catawba. McGuire has no Class F components in the Condensate System.

Catawba Nuclear Station – The Condensate System provides water to various plant equipment as required during all modes of plant operation, including condensate cleanup, startup, normal operation, and shutdown. The Condensate System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Condensate System are listed in Table 3.4-3.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Condensate System:

CN-1590-1.8 CN-2590-1.8

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.4 Condensate Storage System

McGuire Nuclear Station – No portion of the McGuire Condensate Storage System is within the scope of license renewal. Only the Duke Class F portions of the Condensate Storage System are in scope at Catawba. McGuire has no Class F components in the Condensate Storage System.

Catawba Nuclear Station – The Condensate Storage System provides a source of water for various plant equipment as required during all modes of plant operation, including condensate cleanup, startup, normal operation, and shutdown. The Condensate Storage System is a non-safety 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). All components within the seismically designed piping boundaries of this system are within the scope of license renewal per §54.4(a)(2). The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Condensate Storage System are listed in Table 3.4-4.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Condensate Storage System:

CN-1590-2.1 CN-2590-2.1

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.5 Feedwater System

McGuire Nuclear Station – The Feedwater System takes treated Condensate System water, heats it further to improve the plant's thermal cycle efficiency, and delivers it at the required flow rate, pressure and temperature to the steam generators. The Feedwater System is designed to maintain proper vessel water levels with respect to reactor power output and turbine steam requirements. The McGuire UFSAR Section 10.4.7, Condensate and Feedwater System, provides additional information concerning the McGuire Feedwater System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Feedwater System are listed in Table 3.4-5.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Feedwater System:

MCFD-1591-01.01	MCFD-2591-01.01

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Feedwater System takes treated Condensate System water, heats it further to improve the plant's thermal cycle efficiency, and delivers it at the required flow rate, pressure and temperature to the steam generators. The Feedwater System is designed to maintain proper vessel water levels with respect to reactor power output and turbine steam requirements. The Catawba UFSAR Section 10.4.7, Condensate and Feedwater System, provides additional information concerning the Catawba Feedwater System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Feedwater System are listed in Table 3.4-5.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Feedwater System:

CN-1591-1.1	CN-2591-1.1
CN-1592-1.1	CN-2592-1.1

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.6 Feedwater Pump Turbine Exhaust System

McGuire Nuclear Station – The Turbine Exhaust System exhausts steam from the turbine-driven auxiliary feedwater pump turbine and the feedwater pump turbines. The Turbine Exhaust System is not described in the McGuire UFSAR. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Turbine Exhaust System are listed in Table 3.4-6.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Turbine Exhaust System:

MCFD-1593-01.02	MCFD-1612-04.00	MCFD-2593-02.00
MCFD-1593-02.00	MCFD-2593-01.02	MCFD-2612-04.00

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Feedwater Pump Turbine Exhaust System provides a flowpath for the exhaust steam from the turbine-driven auxiliary feedwater pump turbine. The steam to the turbine-driven auxiliary feedwater pump turbine is provided by the Main Steam System. The Catawba UFSAR Sections 10.3, Main Steam System, provides additional information concerning the design and operation of these systems. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Feedwater Pump Turbine Exhaust System are listed in Table 3.4-6.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Feedwater Pump Turbine Exhaust System:

CN-1593-1.2	CN-2593-1.2

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.7 Feedwater Pump Turbine Hydraulic Oil System

McGuire Nuclear Station – The Feedwater Pump Turbine Hydraulic Oil System provides emergency trip to the feedwater pump turbine steam valves and overspeed exercisers for ATWS mitigation. The McGuire Feedwater Pump Turbine Hydraulic Oil System is not described in the McGuire UFSAR. The turbine trip signal causes pressure to be bled off the hydraulic system causing the stop and governor valves to close. The components required to meet these functions are either active components or are passive components whose failure will not prevent the desired action from occurring. Failure of the pressure boundary of the valve bodies or piping will create a loss of hydraulic pressure causing the stop and governor valves to close which would not prevent the safety function. Therefore, the components are in scope, but no aging management review is required.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Feedwater Pump Turbine Hydraulic Oil System:

MCFD-1616-01.00	MCFD-2616-01.00
MCFD-1616-02.00	MCFD-2616-02.00

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Feedwater Pump Turbine Hydraulic Oil System provides emergency trip to the feedwater pump turbine steam valves and overspeed exercisers for ATWS mitigation. The Catawba Feedwater Pump Turbine Hydraulic Oil System is not described in the Catawba UFSAR. The turbine trip signal causes pressure to be bled off the hydraulic system causing the stop and governor valves to close. The components required to meet these functions are either active components or are passive components whose failure will not prevent the desired action from occurring. Failure of the pressure boundary of the valve bodies or piping will create a loss of hydraulic pressure causing the stop and governor valves to close which would not prevent the safety function. Therefore, the components are in scope, but no aging management review is required.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Feedwater Pump Turbine Hydraulic Oil System:

CN-1616-1.0	CN-2616-1.0
CN1616-1.1	CN-2616-1.1
CN-1616-2.0	CN-2616-2.0
CN-1616-2.1	CN-2616-2.1

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.8 Main Steam System

McGuire Nuclear Station – The Main Steam System dissipates heat from the Reactor Coolant System, provides main steam overpressure protection, minimizes positive reactivity effects associated with a main steam line rupture, minimizes the containment temperature increase associated with a main steam line rupture within containment, and provides steam to the turbine driven auxiliary feedwater pump, as needed. The McGuire UFSAR Section 10.3, Main Steam Supply System, provides additional information concerning the McGuire Main Steam System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Main Steam System are listed in Table 3.4-7.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Main Steam System:

MCFD-1593-01.00	MCFD-1593-02.00	MCFD-2593-01.03
MCFD-1593-01.01	MCFD-2593-01.00	MCFD-2593-02.00
MCFD-1593-01.02	MCFD-2593-01.01	MCFD-2612-04.00
MCFD-1593-01.03	MCFD-2593-01.02	MCFD-1591-01.01

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Main Steam System dissipates heat from the Reactor Coolant System, provides main steam overpressure protection, minimizes positive reactivity effects associated with a main steam line rupture, minimizes the containment temperature increase associated with a main steam line rupture within containment, and provides steam to the turbine driven auxiliary feedwater pump, as needed. The Catawba UFSAR Section 10.3, Main Steam Supply System, provides additional information concerning the Catawba Main Steam System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Main Steam System are listed in Table 3.4-7.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Main Steam System:

CN-1593-1.0	CN-1591-1.1	CN-2593-1.2
CN-1593-1.1	CN-1565-2.2	CN-2593-1.3
CN-1593-1.2	CN-1592-1.0	CN-2593-1.7
CN-1593-1.3	CN-2593-1.0	CN-2591-1.1
CN-1593-1.7	CN-2593-1.1	CN-2565-2.2

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.9 Main Steam Supply to Auxiliary Equipment

McGuire Nuclear Station – The Main Steam Supply to Auxiliary Equipment transfers steam to the turbine driven auxiliary feedwater pump turbine, so that the design bases of the Auxiliary Feedwater System can be met. The McGuire UFSAR Section 10.3, Main Steam Supply System, provides additional information concerning the McGuire Main Steam Supply to Auxiliary Equipment. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Main Steam Supply to Auxiliary Equipment System are listed in Table 3.4-8.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Main Steam Supply to Auxiliary Equipment System:

MCFD-1593-01.02 MCFD-2593-01.02

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Main Steam Auxiliary Equipment transfers steam to the turbine driven auxiliary feedwater pump turbine, so that the design bases of the Auxiliary Feedwater System can be met. The Catawba UFSAR, Section 10.3, Main Steam Supply System, provides additional information concerning the Catawba Main Steam Auxiliary Equipment. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Main Steam Auxiliary Equipment System are listed in Table 3.4-8.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Main Steam Auxiliary Equipment System:

CN-1593-1.1 CN-2593-1.1

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.10 Main Steam Vent to Atmosphere System

McGuire Nuclear Station – The Main Steam Vent to Atmosphere System dissipates heat from the Reactor Coolant System, provides main steam overpressure protection, minimizes positive reactivity effects associated with a main steam line rupture, and minimizes the containment temperature increase associated with a main steam line rupture within containment. The McGuire UFSAR Section 10.3, Main Steam Supply System, provides additional information concerning the McGuire Main Steam Vent to Atmosphere System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the McGuire Main Steam Vent to Atmosphere System are listed in Table 3.4-9.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Main Steam Vent to Atmosphere System:

MCFD-1593-01.00	MCFD-1593-01.03	MCFD-2593-01.01
MCFD-1593-01.01	MCFD-2593-01.00	MCFD-2593-01.03

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Main Steam Vent to Atmosphere System dissipates heat from the Reactor Coolant System, provides main steam overpressure protection, minimizes positive reactivity effects associated with a main steam line rupture, and minimizes the containment temperature increase associated with a main steam line rupture within containment. The Catawba UFSAR Section 10.3, Main Steam Supply System, provides additional information concerning the Catawba Main Steam Vent to Atmosphere System. The mechanical components subject to aging management review, their intended functions, and materials of construction for the Catawba Main Steam Vent to Atmosphere System are listed in Table 3.4-9.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Main Steam Vent to Atmosphere System:

CN-1593-1.0	CN-2593-1.0

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.11 Main Turbine Hydraulic Oil System

McGuire Nuclear Station – The Main Turbine Hydraulic Oil System provides a means to trip the main turbine to mitigate the plant response to an ATWS event. The Main Turbine Hydraulic Oil System is not described in the McGuire UFSAR. The components in the Main Turbine Hydraulic Oil System are required to maintain pressure boundary integrity for normal system operation. However, an operational loss of pressure in the hydraulic oil system, or a failure of the pressure boundary of the components highlighted on the attached mechanical system flow diagrams, will produce a turbine trip signal which is a failure in the safe direction. Because a turbine trip signal is the system intended function, there are no component intended functions applicable to the components highlighted on the mechanical system flow diagrams. Therefore, no aging management review is required.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Main Turbine Hydraulic Oil System:

MCFD-1615-01.00	MCFD-1607-01.00
MCFD-1615-02.00	MCFD-1607-01.01
MCFD-1615-02.01	

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Main Turbine Hydraulic Oil System provides a means to trip the main turbine to mitigate the plant response to an ATWS event. The Main Turbine Hydraulic Oil System is not described in the Catawba UFSAR. The components in the Main Turbine Hydraulic Oil System are required to maintain pressure boundary integrity for normal system operation. However, an operational loss of pressure in the hydraulic oil system, or a failure of the pressure boundary of the components highlighted on the attached mechanical system flow diagrams, will produce a turbine trip signal which is a failure in the safe direction. Because a turbine trip signal is the system intended function, there are no component intended functions applicable to the components highlighted on the mechanical system flow diagrams. Therefore, no aging management review is required.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Main Turbine Hydraulic Oil System:

CN-1615-1.1	CN-1607-1.0	CN-2615-1.3
CN-1615-1.2	CN-2615-1.1	CN-2607-1.0
CN-1615-1.3	CN-2615-1.2	

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.12 Main Turbine Lube Oil and Purification System

McGuire Nuclear Station – The Main Turbine Lube Oil and Purification System provides a means to trip the main turbine to mitigate the plant response to an ATWS event. The Main Turbine Lube Oil and Purification System is not described in the McGuire UFSAR. The components in the Main Turbine Lube Oil and Purification System are required to maintain pressure boundary integrity for normal system operation. However, an operational loss of pressure in the hydraulic oil system, or a failure of the pressure boundary of the components highlighted on the attached mechanical system flow diagrams, will produce a turbine trip signal which is a failure in the safe direction. Because a turbine trip signal is the system intended function, there are no component intended functions applicable to the components highlighted on the mechanical system flow diagrams. Therefore, no aging management review is required.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the McGuire Main Turbine Lube Oil and Purification System:

MCFD-1607-01.00	MCFD-2607-01.00
MCFD-1607-01.01	MCFD-2607-01.01

These flow diagrams are contained in Reference [2.3.4-1].

Catawba Nuclear Station – The Main Turbine Lube Oil and Purification System provides a means to trip the main turbine to mitigate the plant response to an ATWS event. The Main Turbine Lube Oil and Purification System is not described in the Catawba UFSAR. The components in the Main Turbine Lube Oil and Purification System are required to maintain pressure boundary integrity for normal system operation. However, an operational loss of pressure in the hydraulic oil system, or a failure of the pressure boundary of the components highlighted on the attached mechanical system flow diagrams, will produce a turbine trip signal which is a failure in the safe direction. Because a turbine trip signal is the system intended function, there are no component intended functions applicable to the components highlighted on the mechanical system flow diagrams. Therefore, no aging management review is required.

The following is a list of the flow diagrams that have been marked to indicate the license renewal evaluation boundary for the Catawba Main Turbine Lube Oil and Purification System:

CN-1607-1.0	CN-2607-1.0

These flow diagrams are contained in Reference [2.3.4-1].

2.3.4.13 References for Section 2.3.4

2.3.4-1. M. S. Tuckman (Duke) letter dated June 13, 2001 to Document Control Desk (NRC), *License Renewal Evaluation Boundary Drawings.* McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-369, 50-370, 50-413, and 50-414.

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2.4 SCOPING AND SCREENING RESULTS: STRUCTURES

Note: The structure and structural component descriptions are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The methodology to identify structures within the scope of license renewal is described in Section 2.1.1 of this Application. Section 2.1.2.2 contains a description of the methodology to identify the structural components that are subject to aging management review.

Structures and structural components are located in this section consistent with Section 2.4 of the draft Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants (August 2000). Structures that are attached to or contained within a larger structure are reviewed with the larger structure as noted below. The following structures are described in Section 2.4, Structures and Structural Components in the section as indicated:

- Auxiliary Building (including Control Building, Diesel Generator Buildings, Fuel Buildings, Groundwater Drainage System, Main Steam Doghouses, and UHI Tank Building (Catawba only)) (Section 2.4.2.1)
- Condenser Cooling Water Intake Structure – McGuire Nuclear Station fire pump rooms only (Section 2.4.2.2)
- Nuclear Service Water Structures (Section 2.4.2.3)
- Reactor Building Units 1 and 2 (including Concrete Shield Building, Steel Containment, Reactor Building Internal Structures) (Section 2.4.1)
- Standby Nuclear Service Water Pond Dam (Section 2.4.2.4)
- Standby Shutdown Facility (Section 2.4.2.5)
- Turbine Buildings (including Service Building) (Section 2.4.2.6)
- Unit Vent Stack (Section 2.4.2.7)
- Yard Structures (including Low Pressure Service Water Intake Structure (Catawba only), Refueling Water Storage Tank foundation and missile wall, Reactor Makeup Water Storage Tank foundations (McGuire only), trenches, and Yard Drainage System (Catawba only)) (Section 2.4.2.8)

Equipment and component supports that are located in all of the above structures and that are within the scope of license renewal are described in Section 2.4.3.

2.4.1 REACTOR BUILDINGS

Note: The Reactor Building description is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

2.4.1.1 Concrete Shield Building

The Concrete Shield Building (or Reactor Building) structure is part of the containment system that is designed to ensure that an acceptable upper limit of leakage of radioactive material is not exceeded under design basis events. The Reactor Building is a seismic Category I structure at McGuire and Catawba. Each Reactor Building is a reinforced concrete structure composed of a right cylinder with a shallow dome and flat circular foundation. The Reactor Building houses the Steel Containment Vessel and is designed to provide biological shielding as well as missile protection for the Steel Containment Vessel. An annulus space is provided between the Reactor Building shell and the Steel Containment Vessel for control of containment external temperatures and pressures. The annulus space also provides a controlled air volume for filtering and access to penetrations for testing and inspection.

Additional information concerning the Concrete Shield Building at McGuire is contained in McGuire UFSAR Section 3.8.1, Concrete Containment.

Additional information concerning the Concrete Shield Building at Catawba is contained in Catawba UFSAR Section 3.8.1, Concrete Containment.

The structural components, component functions, and materials of construction for the Concrete Shield Buildings are listed in Table 3.5-1.

2.4.1.2 Steel Containment

The Steel Containment (or Containment) surrounds the Reactor Coolant System and functions as the primary containment. The Steel Containment is a freestanding welded seismic Category I steel structure with a vertical cylinder, hemispherical dome, and a flat base. The Steel Containment shell is anchored to the Concrete Shield Building foundation by means of anchor bolts around the circumference of the cylinder base. The base of the Containment is a liner plate encased in concrete and anchored to the Concrete Shield Building foundation.

The steel components included within the Steel Containment are as follows:

- Steel Containment Vessel
- Equipment Hatch
- Personnel Air Locks
- Fuel Transfer Penetration
- Mechanical Penetrations

- Electrical Penetrations

Additional information concerning the Steel Containment at McGuire is contained in McGuire UFSAR Section 3.8.2, Steel Containment System.

Additional information concerning the Steel Containment at Catawba is contained in Catawba UFSAR Section 3.8.2, Steel Containment.

The structural components, component functions, and materials of construction for the Steel Containments are listed in Table 3.5-1.

2.4.1.3 Reactor Building Internal Structures

The Reactor Building Internal Structures consist of a variety of reinforced concrete and structural steel structures. The internal structures enclose the Reactor Coolant System and provide biological shielding and pressure boundaries for the lower, intermediate, and upper volumes of the containment interior. These structures also provide support and restraint for all major equipment, components, and systems located within the Reactor Building. The internal structures are supported on the concrete Reactor Building foundation. The Reactor Building Internal Structures include:

- Accumulator floor
- Base slab
- Containment recirculation sump screen assembly
- Crane wall
- CRDM missile shield
- Operating floor
- Pressure seals and gaskets
- Pressurizer enclosures
- Reactor Vessel cavity wall
- Refueling canal
- Steam Generator enclosures
- Ice condenser structural components

Note that Nuclear Steam Supply System (NSSS) component supports are described in Section 2.4.3, Component Supports.

Additional information concerning the Reactor Building Internal Structures at McGuire is contained in McGuire UFSAR Section 3.8.3, Concrete and Structural Steel Internal Structures of the Steel Containment. Additional information concerning the Ice Condenser at McGuire is contained in McGuire UFSAR Section 6.2.2, Ice Condenser System.

Additional information concerning the Reactor Building Internal Structures at Catawba is contained in Catawba UFSAR Section 3.8.3, Concrete and Structural Steel Internal Structures of the Steel Containment. Additional information concerning the Ice Condenser at Catawba is contained in Catawba UFSAR Section 6.7, Ice Condenser System.

The structural components, component functions, and materials of construction for the Reactor Building Internal structures are listed in Table 3.5-1.

2.4.2 OTHER STRUCTURES

Note: The structure descriptions are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

2.4.2.1 Auxiliary Buildings

The Auxiliary Buildings are a collection of structures that house equipment necessary for the safe operation of the plant. Each nuclear station has one Auxiliary Building that is shared by both reactor units. The Auxiliary Building is a seismic Category I reinforced concrete structure. The Auxiliary Building is integrally connected with the Spent Fuel Building and the Inside Main Steam Doghouse. The Auxiliary Building is connected with the Diesel Generator Building by cable tunnels. Additional information concerning the Auxiliary Buildings at McGuire is contained in McGuire UFSAR Section 3.8.4.1, Auxiliary Building. Additional information concerning the Auxiliary Buildings at Catawba is contained in Catawba UFSAR Section 3.8.4, Other Seismic Category I Structures.

The Control Building is a part of the reinforced concrete Auxiliary Building. The Control Building is a seismic Category I structure which houses the control room, battery room, and the cable room.

The Diesel Generator Buildings are free-standing reinforced concrete structures. The Diesel Generator Buildings are seismic Category I structures which house the emergency diesel generators.

The Fuel Buildings are reinforced concrete structures. The Fuel Buildings are seismic Category I structures which provide storage for the new and spent fuel.

The Groundwater Drainage System is provided for the Auxiliary Building, Diesel Generator Buildings, and the Reactor Buildings and is designed to maintain the normal groundwater level near the base of these structures. The Groundwater Drainage System is composed of a network of horizontal foundation underdrains and continuous exterior wall drains. Three groundwater sumps are located along the perimeter of the Auxiliary Building. Additional information concerning the McGuire Groundwater Drainage System is contained in McGuire UFSAR Section 2.4.13, Groundwater. Additional information concerning the Catawba Groundwater Drainage System is contained in Catawba UFSAR Section 2.4.13, Groundwater.

The Main Steam Doghouses are reinforced concrete structures . The Main Steam Doghouses are seismic Category I structures which house the high pressure steam and feedwater piping.

The Upper Head Injection Tank Building at Catawba is a reinforced concrete structure. The Upper Head Injection Tank Building houses equipment that is within the scope of license renewal.

The structural components, component functions, and materials of construction for the Auxiliary Building Structures are listed in Table 3.5-2.

2.4.2.2 Condenser Cooling Water Intake Structure

McGuire Nuclear Station – The Condenser Cooling Water Intake Structure houses the three main fire pumps for the station. The Fire Pump rooms are the only parts of the structure that are within the scope of license renewal. The Condenser Cooling Water Intake Structure is constructed of reinforced concrete and carbon steel and provides structural support and/or shelter to components relied on during certain postulated fire events. The Condenser Cooling Water Intake Structure is a Category III structure and is not designed to withstand design basis seismic loadings.

The structural components, component functions, and materials of construction for the Condenser Cooling Water Intake Structure are listed in Table 3.5-2.

Catawba Nuclear Station – Only the portion of the McGuire Condenser Cooling Water Intake Structure that supports the fire pumps is within the scope of license renewal. The fire pumps at Catawba are supported by the Low Pressure Service Water Intake Structure. The Low Pressure Service Water Intake Structure is included with the Yard Structures.

2.4.2.3 Nuclear Service Water Structures

McGuire Nuclear Station – The Nuclear Service Water Structures include both the Standby Nuclear Service Water Pond Intake Structure and the Standby Nuclear Service Water Pond Discharge Structure. The Standby Nuclear Service Water Pond Intake Structure is a completely submerged reinforced concrete structure located at the bottom of the Standby Nuclear Service Water Pond east of the Standby Nuclear Service Water Pond Dam. The Intake Structure is designed to act as the headwall for the nuclear service water intake pipes and to provide missile protection for these pipes. The Standby Nuclear Service Water Pond Discharge Structure is located on the northern portion of the Standby Nuclear Service Water Pond near the pond surface. The Discharge Structure provides a concrete headwall to prevent erosion around the discharge pipes. Missile protection of the discharge pipes is provided by the soil backfill over a stepped concrete slab.

The structural components, component functions, and materials of construction for the Nuclear Service Water Structures are listed in Table 3.5-2.

Catawba Nuclear Station – The Nuclear Service Water Structures include several structures. The Nuclear Service Water and Standby Nuclear Service Water Pump Structure is a reinforced concrete structure founded on solid rock. The reinforced concrete roof, exterior walls, and interior wall provide missile protection. Reinforced concrete roof hatches provide a fire barrier and a missile barrier. Pressure doors are provided in the pump structure to withstand tornado induced negative pressure. The interior wall and some exterior walls provide fire barriers.

The Nuclear Service Water Conduit Manholes and the Nuclear Service Water Intake Structure are seismic Category I structures constructed of reinforced concrete. The Nuclear Service Water Intake Structure is submerged in the plant intake channel and is designed to house the Nuclear Service Water Intake Pipe, provide an intake chamber, secure fish impingement screens, provide missile protection for the intake pipe and act as an earth/silt retaining wall.

The Standby Nuclear Service Water Discharge Structures are reinforced concrete headwall structures designed as seismic Category I structures. Two structures are located within the pond. Each discharge structure is designed to house two Standby Nuclear Service Water discharge pipes, provide missile protection for the discharge piping, and act as an earth retaining wall.

The Standby Nuclear Service Water Intake Structure is a reinforced concrete box-shaped structure designed as seismic Category I. The Standby Nuclear Service Water Intake Structure houses the Nuclear Service Water Intake Pipe, provides an intake chamber, secures the fish impingement screens, provides missile protection for the intake pipe and acts as an earth/silt retaining wall.

The Standby Nuclear Service Water Pond Outlet is a seismic Category I structure consisting of a steel pipe located in the south abutment of the Standby Nuclear Service Water Pond with a reinforced concrete headwall on the Standby Nuclear Service Water Pond side and a reinforced concrete endwall on the Lake Wylie side. The headwall contains and protects the pipe, supports the missile shield, supports the weir and its missile shield, and contains the trash rack.

The structural components, component functions, and materials of construction for the Nuclear Service Water Structures are listed in Table 3.5-2.

2.4.2.4 Standby Nuclear Service Water Pond Dam

The Standby Nuclear Service Water Pond Dam is an earthen embankment that has been designed as a seismic Category I structure. The Standby Nuclear Service Water Pond Dam impounds the water within the Standby Nuclear Service Water Pond at each station to provide an alternate source of water for the Standby Nuclear Service Water System. The dam provides structural and/or functional support to safety-related equipment and ultimate heat sink following a postulated loss of coolant accident or loss of lake.

The structural components, component functions, and materials of construction for the Standby Nuclear Service Water Pond Dam are listed in Table 3.5-2.

2.4.2.5 Standby Shutdown Facility

The Standby Shutdown Facility structure houses a dedicated diesel generator and its supporting equipment, electrical equipment room batteries, and control rooms for both units of each station. The Standby Shutdown Facility structure is a steel-frame and masonry structure that is designed as a Category III structure. It is not designed to withstand design basis seismic loadings. The Standby Shutdown Facility structure provides structural support and/or shelter to components relied on during certain postulated events.

The structural components, component functions, and materials of construction for the Standby Shutdown Facility structure are listed in Table 3.5-2.

2.4.2.6 Turbine Buildings (including Service Building)

The Turbine Buildings and Service Building are Category III structures and are not designed to withstand design basis seismic loadings. The Turbine Buildings (including Service Building) at each station are constructed of a steel frame superstructure supported on a reinforced concrete substructure and provide structural support and/or shelter to components relied on during certain postulated events. The Turbine Buildings (including Service Building) are supported on foundations bearing on dense soil, partially weathered rock, and rock. At McGuire, the southern portion of the Service Building and the southwest portion of the Unit 1 Turbine Building are underlain by compacted soil and are supported on end bearing caissons.

The structural components, component functions, and materials of construction for the Turbine Buildings (including Service Building) are listed in Table 3.5-2.

2.4.2.7 Unit Vent Stack

The Unit Vent Stack is a seismic Category I structure that is a stiffened cylindrical shell. The vent stack is attached to the outside of the Reactor Building shell wall and is supported vertically by the Auxiliary Building roof. The Unit Vent Stack is provided for each unit and provides the primary release point for gaseous effluents from the unit.

The structural components, component functions, and materials of construction for the Unit Vent Stack are listed in Table 3.5-2.

2.4.2.8 Yard Structures

McGuire Nuclear Station – The Refueling Water Storage Tank is founded on residual soils and its foundation is a poured-in-place reinforced concrete composite structure. The Refueling Water Storage Tank missile wall encloses the foundation mat. The Refueling Water Storage Tank missile wall is a free-standing reinforced concrete structure that is capable of containing an assured source of water. The Refueling Water Storage Tank missile wall and foundation are seismic Category I structures. The Reactor Makeup Water Storage Tank foundation is designed as a seismic Category I structure and is constructed of reinforced concrete.

Trenches are provided throughout the McGuire yard to allow underground routing of cables and piping. Trenches that are within the scope of license renewal are the Refueling Water Storage Tank pipe trenches, the Standby Shutdown facility cable trenches, and the Condenser Cooling Water Intake structure cable trenches. Trenches are constructed of reinforced concrete and covers for the trenches are either made of concrete or consist of checkered steel plates.

The structural components, component functions, and materials of construction for the Yard Structures are listed in Table 3.5-2.

Catawba Nuclear Station – The Yard Structures of Catawba include the Yard Drainage System that provides a drainage system capable of protecting all safety-related structures from flooding during a local probable maximum precipitation event. The system consists of catch basin inlets that are connected by corrugated metal pipes to form several networks. The catch basis inlets are constructed of angle iron and grating.

The Refueling Water Storage Tank is founded on weathered rock or fill concrete to weathered rock and its foundation is a poured-in-place reinforced concrete composite structure. The Refueling Water Storage Tank missile wall encloses the foundation mat. The Refueling Water Storage Tank missile wall is a free-standing reinforced concrete structure that is capable of containing an assured source of water. The Refueling Water Storage Tank missile wall and foundation are seismic Category I structures.

Trenches are provided throughout the Catawba yard to allow underground routing of cables and piping. Trenches that are within the scope of license renewal are the Refueling Water Storage Tank pipe trenches and the Standby Shutdown facility cable trenches. Trenches are constructed of reinforced concrete and covers for the trenches are either made of concrete or consist of checkered steel plates.

The Low Pressure Service Water Intake Structure is a reinforced concrete structure that supports the fire pumps. The fire pumps are within the scope of license renewal and thus, the support structure is also within scope.

The structural components, component functions, and materials of construction for the Yard Structures are listed in Table 3.5-2.

2.4.3 COMPONENT SUPPORTS

Component supports are those components that provide support or enclosure for mechanical and electrical equipment. Component supports includes battery racks, cable tray and conduit, cable tray and conduit supports, control boards, crane rails, enclosures, equipment component supports, HVAC duct supports, instrument line supports, instrument racks & frames, lead shielding supports, new fuel storage racks, pipe supports, stair, platform and grating supports, and spent fuel storage racks. These supports are constructed of steel or stainless steel and are located in all of the structures within the scope of license renewal for McGuire Nuclear Station and Catawba Nuclear Station.

Also included within this section covering component supports are the Class 1 (Nuclear Steam Supply System) Supports. These Class 1 component supports include Reactor Coolant System piping supports, pressurizer upper and lower lateral supports, reactor vessel support, control rod drive seismic structure supports, steam generator vertical, lower lateral, and upper supports, and reactor coolant pump lateral and vertical support assemblies. Additional information concerning the Class 1 component supports at McGuire is contained in McGuire UFSAR Section 5.5.14, Component Supports. Additional information concerning the Class 1 component supports at Catawba is contained in Catawba UFSAR Section 5.4.14, Component Supports.

The structural components, component functions, and materials of construction for the Component Supports are listed in Table 3.5-3.

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2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL AND INSTRUMENTATION AND CONTROLS

Note: The electrical and instrumentation and controls descriptions are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station.

The methodology to identify the electrical and instrumentation and controls (I&C) components that are subject to an aging management review is described in Section 2.1 (scoping) and Section 2.1.2.3 (passive screening and long-lived screening). To be subject to an aging management review, a component must meet all three criteria: scoping—§54.4(a), passive screening—§54.21(a)(1)(i), and long-lived screening §54.21(a)(1)(ii). Conversely, if a component or commodity does not meet any one of these criteria, then it is not subject to an aging management review.

The passive electrical and I&C commodities are identified in Table 2.1-2. Other electrical and I&C components are active and not subject to an aging management review.

Switchyard Systems were found not to meet any of the scoping criteria of §54.4(a). Consequently, the passive electrical commodities of switchyard bus, transmission conductors and high-voltage insulators are not within the scope of license renewal.

The Unit Main Power System and Nonsegregated-Phase Bus in the 6.9kV Normal Auxiliary Power System were found not to meet any of the scoping criteria of §54.4(a). Consequently, the passive electrical commodity of phase bus is not within the scope of license renewal.

The passive electrical commodity of uninsulated ground conductors was found not to meet any of the scoping criteria of §54.4(a). Consequently, uninsulated ground conductors are not within the scope of license renewal.

Electrical components included in the McGuire and Catawba *Environmental Qualification Program* do not meet the long-lived screening criterion of §54.21(a)(1)(ii). Consequently, some insulated cables and connections are not subject to an aging management review and none of the electrical portions of all electrical and I&C penetration assemblies are subject to an aging management review.

The result of this review is the determination that the electrical components that are subject to an aging management review are:

- Non-EQ insulated cables and connections
  (power, instrumentation and control applications; connections include plug-in connectors, splices and terminal blocks)

The intended function of insulated cables and connections is to provide an electrical connection to specified sections of an electrical circuit to deliver voltage, current or signals.

The pressure boundary function that may be associated with some electrical and I&C components (elements, RTDs, sensors, thermocouples, transducers, and heaters) is included in the process of identifying the mechanical pressure boundaries and is included in the applicable mechanical reviews within this Application (e.g., Sections 2.3, 3.1, 3.2, 3.3, and 3.4). Electrical components are supported by structural components (e.g., cable trays, conduit and cable trenches) that are included in the structural review provided in Sections 2.4 and 3.5.

The aging management review for non-EQ insulated cables and connections is provided in Section 3.6 of this Application and is summarized in Table 3.6-5.

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3.0 AGING MANAGEMENT REVIEW RESULTS

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

Note: The aging management reviews for all Reactor Coolant System components are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The following Reactor Coolant System components are evaluated in the Table 3.1-1:

- Class 1 Piping, Valves, and Pump Casings
- Pressurizer
- Reactor Vessel and Control Rod Drive Mechanism Pressure Boundary
- Reactor Vessel Internals
- Steam Generator

3.1.1 AGING MANAGEMENT REVIEW RESULTS TABLES

The results of the aging management review for each component is provided in a table, as indicated above. Information contained in each table was obtained in the following manner:

Column 1 – The component types listed in Column 1 were identified through the screening methodology described in Section 2.1.2 of this application and are on the marked plant drawings identified in Section 2.3.2 of this application.

Column 2 – The component functions listed in Column 2 were obtained from plant specific engineering documents using the screening methodology described in Section 2.1.2.

Column 3 – The materials listed in Column 3 were obtained from the drawings identified in Section 2.3.2 of this application and other plant specific engineering documents.

Column 4 – The internal and external environments listed in Column 4 were obtained from plant specific engineering documents. External environments are also noted on the drawings identified in Section 2.3.2 of this Application. These environments are as follows:

- **Borated Water –** Borated water is demineralized water treated with boric acid.

- **Treated water –** Treated water is demineralized water that may be deareated, treated with a biocide or corrosion inhibitors, or a combination of these treatments. Treated water does not include borated water, which is separately evaluated.

- **Reactor Building –** The Reactor Building environment is moist air. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

Column 5 – The aging effects listed in Column 5 were obtained using the following aging effects identification process. The aging effects that require management during the period of extended operation have been determined by reviewing the plant-specific materials of construction (Column 3) and operating environments (Column 4) for each structure and component (Column 1) that is subject to an aging management review. The aging effects identification process assumes that licensed activities will continue to be conducted in accordance with the facilities' current licensing basis (e.g., use of low enriched uranium dioxide fuel only).

To provide reasonable assurance that the aging effects that require management for a specific material-environment combination are the only aging effects of concern for McGuire and Catawba, Duke also has performed a review of industry experience and NRC generic communications relative to these structures and components. Finally, relevant McGuire and Catawba operating experience have been reviewed to provide further confidence that the set of aging effects for the specific material-environment combinations have been identified. Taken together, the steps of this methodology provide reasonable assurance that the aging effects that require management during the period of extended operation for McGuire and Catawba structures and components have been identified.

Reduction in fracture toughness due to thermal embrittlement can be an aging effect for certain types of cast austenitic stainless steel in locations where temperatures continuously exceed 482ºF. In a May 19, 2000 letter to NEI, Christopher I. Grimes, Chief License Renewal and Standardization Branch, clarified that not all cast austenitic stainless steels are subject to thermal embrittlement [Footnote 3.1 - 1]. The Class 1 components fabricated from cast austenitic stainless steel (CASS) that are evaluated using the criteria in the May 19, 2000 letter are piping components, valve bodies, reactor coolant pump casings and main flanges,

3.1 - 1. C. I. Grimes (NRC) letter dated May 19, 2000 to D. J. Walters (NEI), *License Renewal Issue No. 98-0030, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Components,"* Project No. 690.

and parts of the CRDM latch housing. The CASS components were evaluated using the criteria set forth in this letter with the following results:

- A delta ferrite calculation was performed for CASS piping and pump casings and only the McGuire Unit 1, Primary Loop 2, 27 ½ inch ID Loop B cold leg elbow exceeds the NRC established threshold for susceptibility to thermal embrittlement and requires aging management review for license renewal.
- Thermal embrittlement of the CASS valve bodies will be managed by the *Inservice Inspection Plan*.
- The CRDM latch housings are centrifigally cast and are not susceptible to thermal embrittlement.
- The reactor vessel internals CASS items will be managed by the *Reactor Vessel Internals Inspection.*

Reduction in fracture toughness due to irradiation embrittlement of the alloy steel reactor vessel is an aging effect only in the beltline region. Beltline is defined by 10 CFR 50.61 (a)(3) as the region of the reactor vessel that directly surrounds the effective height of the active core and adjacent regions of the reactor vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection of the most limiting material with regard to radiation damage. Reduction of fracture toughness is also considered for stainless steel components that are adjacent to active fuel assemblies.

This aging effects identification process is consistent with that process used in Section 3.5 of the Oconee Nuclear Station license renewal application. Furthermore, in NUREG-1723, the staff concluded that based on its review of the information provided in Sections 3.5.1 and 3.5.2 of the Oconee application, “the applicant has identified the aging effects that are associated with mechanical systems components reviewed in [Section 3.5].” This aging effects identification process provides reasonable assurance that the aging effects that require management during the period of extended operation have been identified.

Column 6 – The aging management programs and activities listed in Column 6 are credited to manage the effects of aging for the period of extended operation.

For bolting, in addition to the aging management programs listed, information from operating experience indicates that there are additional elements of bolting maintenance procedures that should be considered, such as personnel training, installation and maintenance procedures, plant-specific bolting degradation history, and corrective measures. The NRC captured the lessons from this experience in IE Bulletin 82-02 [Footnote 3.1 - 2] and directed each licensee to assure that these lessons were being incorporated at their plant. In response to IE Bulletin 82-02, Duke provided the results of the in-house investigation and provided assurance that bolting maintenance practices did indeed consider these lessons learned. In summary, routine maintenance practices have included use of properly trained personnel and procedural guidance to construct bolted closures. The continuation of routine maintenance practices reviewed under IE Bulletin 82-02 will assure aging management of mechanical closure integrity for bolted closures in the Reactor Coolant System.

3.1.2 AGING MANAGEMENT PROGRAMS

The following aging management programs and activities are credited to manage the effects of aging for the components of the Reactor Coolant System listed in Section 3.1:

- Alloy 600 Aging Management Review
- Bottom-Mounted Instrumentation Thimble Tube Inspection Program
- Chemistry Control Program *
- Control Rod Drive Mechanism and Other Vessel Closure Penetration Inspection Program*
- Flow Accelerated Corrosion Program*
- Fluid Leak Management Program*
- Inservice Inspection Plan*
- Reactor Coolant System Operational Leakage Monitoring Program*
- Reactor Vessel Integrity Program*
- Reactor Vessel Internals Inspection *
- Steam Generator Surveillance Program*

** This aging management program/activity is equivalent or similar to the corresponding program/activity that has been previously reviewed and found acceptable by the NRC staff during the Oconee License Renewal review, as documented in NUREG-1723.*

Based on the evaluations provided in Appendix B for the aging management programs and activities listed above, the aging effects will be adequately managed such that the intended functions of the components listed in Table 3.1-1 will be maintained consistent with the current licensing basis for the period of extended operation.

3.1 - 2. IE Bulletin 82-02 dated June 2, 1982, *Degradation of Threaded Fasteners in Reactor Coolant Pressure Boundary of PWR Plants*.

Table 3.1-1 Aging Management Review Results – Reactor Coolant System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Exterior Surfaces and Bolted Closures					
Exterior surfaces of pressure boundary components	PB	Alloy Steel, Carbon Steel	Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bolting Material (all bolting is less than 2 inches)	PB	Stainless Steel	Reactor Building	Cracking Loss of Preload	Inservice Inspection Plan
Reactor Coolant Pump Main Flange Bolts	PB	Alloy Steel, Stainless Steel	Reactor Building	Cracking Loss of material (ferritic fasteners) Loss of Preload	Inservice Inspection Plan Fluid Leak Management Program
Pressurizer Manway Cover Bolts/Studs	PB	Alloy Steel	Reactor Building	Cracking Loss of Material Loss of Preload	Inservice Inspection Plan Fluid Leak Management Program
Reactor Vessel Closure Studs, nuts, and washers	PB	Alloy Steel	Reactor Building	Cracking, Loss of Material Loss of Preload	Inservice Inspection Plan Reactor Coolant System Operational Leakage Monitoring Program
Steam Generator Bolting	PB	Alloy Steel	Reactor Building	Cracking Loss of Material Loss of Preload	Fluid Leak Management Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Exterior Surfaces and Bolted Closures (continued)					
Exterior Surfaces of Pressure Boundary Components	PB	CASS, Stainless Steel	Reactor Building	None Identified	None Required
Reactor Vessel and Pressurizer Integral Attachments	Support	Alloy Steel, Carbon Steel	Reactor Building	Cracking Loss of Material	Inservice Inspection Plan Fluid Leak Management Program
Class 1 Piping, Valve Bodies, and Pump Casings					
Hot and Cold Leg Pipe – 31” ID, 29” ID, 27.5” ID	PB	CASS	Borated water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
MNS Unit 1 27.5” ID Loop B elbow	PB	CASS (SA-351 CF8A)	Borated Water	Loss of Material Cracking Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan
Pipe and Fittings NPS$\leq$ 1”	PB	Stainless steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Class 1 Piping, Valve Bodies, and Pump Casings (continued)					
Pipe fittings and branch connections 1” > NPS < 4” (includes sample scoops and thermowells)	PB	Stainless steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Pipe, fittings, and branch connections NPS $\geq$ 4” (includes spray scoops)	PB	Stainless steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Orifices	PB, TH	Stainless steel	Borated Water	Loss of Material Cracking	Chemistry Control Program
Forged Stainless Steel Valve bodies and/or Bonnets	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program
Cast Stainless Steel Valve bodies and/or Bonnets	PB	CASS	Borated Water	Loss of Material Cracking Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Class 1 Piping, Valve Bodies, and Pump Casings (continued)					
Reactor Coolant Pump Casings	PB	CASS	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Main Pump Closure Flange	PB	CASS	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Thermal Barrier Heat Exchanger piping (tubing) and flanges	PB	Stainless steel	Treated Water	Loss of Material Cracking	Chemistry Control Program
			Borated Water	Loss of Material Cracking	Chemistry Control Program

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pressurizer					
Lower Head Shell Upper Head Manway	PB	Alloy Steel Clad with Stainless Steel	Borated Water	Loss of Material (cladding) Cracking	Chemistry Control Program Inservice Inspection Plan
Surge Nozzle Spray Nozzle Relief Nozzle Safety Nozzle	PB	Alloy Steel Clad with Stainless Steel (Nickel Based Alloy Weld Build Up)	Borated Water	Loss of Material (cladding) Cracking	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Immersion Heaters Sheath	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program
Surge and Spray Nozzle Thermal Sleeves	PB	Stainless Steel (Nickel-Based Alloy Weld)	Borated Water	Loss of Material Cracking	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pressurizer (continued)					
Support Skirt and Flange	Component Support	Carbon Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inservice Inspection Plan
Manway Insert	PB	Stainless Steel or Nickel-Based Alloy	Borated Water	Loss of material Cracking	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Heater Well Nozzle	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Instrument Nozzles	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Surge Nozzle Safe End Spray Nozzle Safe End Relief Nozzle Safe End Safety Nozzle Safe End	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel and CRDM Pressure Boundary Components					
Closure head dome, flange, ring and vessel flange	PB	Alloy Steel Stainless Steel Clad	Borated Water	Loss of Material (cladding) Cracking	Chemistry Control Program Inservice Inspection Plan
Upper (nozzle) shell	PB	Alloy Steel Stainless Steel Clad	Borated Water	Loss of Material (cladding) Cracking	Chemistry Control Program Inservice Inspection Plan
Primary Inlet and Outlet Nozzles	PB	Alloy Steel Forging Stainless Steel Clad (Nickel Based Alloy Buttering and weld)	Borated Water	Loss of Material (cladding) Cracking	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Inlet and Outlet Nozzle Safe Ends	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Intermediate shell	PB	Alloy Steel Stainless Steel Clad	Borated Water	Loss of Material (cladding) Cracking Reduction of Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Integrity Program

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel and CRDM Pressure Boundary Components (continued)					
Lower Shell	PB	Alloy Steel Stainless Steel Clad	Borated Water	Loss of Material (cladding) Cracking Reduction of Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Integrity Program
Bottom head spherical ring, dome	PB	Alloy Steel Stainless Steel Clad	Borated Water	Loss of Material (cladding) Cracking	Chemistry Control Program Inservice Inspection Plan
CRDM Housings	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
CRDM Housings	PB	CASS	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel and CRDM Pressure Boundary Components (continued)					
CRDM Housings	PB	Nickel Based Alloy	Borated Water	Loss of Material Cracking	Alloy 600 Aging Management Review Chemistry Control Program CRDM and Other Vessel Closure Penetration Inspection Program Inservice Inspection Plan Reactor Coolant System Operational Leakage Monitoring Program
UHI Auxiliary Head Adapter Flange	PB	Nickel Based Alloy and Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan CRDM and Other Vessel Closure Penetration Inspection Program
Head Vent Penetration	PB	Nickel Based Alloy and Stainless Steel	Borated Water	Loss of Material Cracking	Alloy 600 Aging Management Review Chemistry Control Program CRDM and Other Vessel Closure Penetration Inspection Program
Thimble Assembly	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Bottom Mounted Thimble Tube Instrumentation Inspection Program

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel and CRDM Pressure Boundary Components (continued)					
Bottom Mounted Instrumentation tubes (penetrations)	PB	Nickel Based Alloy	Borated Water	Loss of Material Cracking	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Thimble Guide Tubes	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Thimble Seal Table	PB	Stainless Steel	Borated Water	Loss of Material Cracking	Chemistry Control Program
Core Support Pads	Support	Nickel Based Alloy	Borated Water	Loss of Material Cracking	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Reactor Vessel Internals					
Upper Core Support Structure					
Upper Support Assembly (Forging, Plates, Weld))	1,2,3,4	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Upper Support Column	1,2,4	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Upper Support Column (Base, Conduit Support, Thermocouple stop (U1))	1,2,4	CASS	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel Internals (continued)					
Upper Core Support Structure (continued)					
Upper Support Column Bolts	1,2,4	Stainless Steel	Borated Water	Cracking Loss of Material Loss of Preload (bolting)	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
Upper Core Plate	1,2,3,4	Stainless Steel	Borated Water	Cracking Loss of Material Dimensional Changes Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
Upper Core Plate Alignment Pins	1	Stainless Steel	Borated Water	Cracking Loss of Material Dimensional Changes	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
Fuel Alignment Pins	1	Stainless Steel	Borated Water	Cracking Loss of Material Dimensional Changes Loss of Preload	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel Internals (continued)					
Upper Core Support Structure (continued)					
Hold Down Spring	1	Stainless Steel	Borated Water	Cracking Loss of Material Loss of Preload	Chemistry Control Program Inservice Inspection Plan
Thermocouple Column and Crossrun Assemblies	4	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
17X17 and 15X15 Guide Tube Assembly	2 (17X17 only), 3	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel Internals (continued)					
Upper Core Support Structure (continued)					
15X15 and 17X17 Guide Tube Assembly	3	CASS	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
UHI Flow Columns	3	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
UHI Flow Columns (Base)	3	CASS	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel Internals (continued)					
Lower Core Support Structure					
Core Barrel Flange Core Barrel Outlet Nozzles Neutron Panels Irradiation Specimen Holder Fasteners	1,3,4,5,6	Stainless Steel	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness Dimensional Changes Loss of Preload (bolting)	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
Irradiation Specimen Holder (spring)	5	Nickel Based Alloy	Borated Water	Loss of Material Cracking	Alloy 600 Aging Management Review Inservice Inspection Plan Chemistry Control Program
Baffle and Former Plates	1,3,6	Stainless Steel	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness Dimensional Changes	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel Internals (continued)					
Lower Core Support Structure (continued)					
Baffle Bolts (baffle to baffle, baffle to former)	1,3	Stainless Steel	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness Dimensional Changes Loss of Preload (bolting)	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
Lower Core Plate Fuel Alignment Pins Lower Support Column Bolts	1,3,4,5	Stainless Steel	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness Dimensional Changes Loss of Preload (bolting)	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection
Lower Support Plate (forging) Lower Core Support Columns	1,3,4,5,6	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Radial Keys and fasteners	1	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Vessel Internals (continued)					
Lower Core Support Structure (continued)					
Clevis Inserts and fasteners	1	Nickel Based Alloy	Borated Water	Cracking Loss of Material	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Bottom Mounted Instrumentation					
Bottom Mounted Instrumentation (Plates, forgings, welds, energy absorber, fasteners)	3,4,5	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Bottom Mounted Instrumentation (upper end, cruciform)	4	CASS	Borated Water	Cracking Loss of Material Reduction in Fracture Toughness	Chemistry Control Program Inservice Inspection Plan Reactor Vessel Internals Inspection

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Steam Generators					
Primary Head/Cladding (CNS – 2 only)	PB	Alloy steel Stainless Steel Clad	Borated Water	Loss of Material (cladding) Cracking	Chemistry Control Program Inservice Inspection Plan
Primary Nozzle Closure Rings (CNS – 2 only)	PB	Nickel Based Alloy	Borated Water	Cracking Loss of Material	Chemistry Control Program Alloy 600 Aging Management Review
Secondary Manway (CNS – 2 only)	PB	Alloy Steel	Treated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Secondary Manway Covers Handhole Covers (CNS – 2 only)	PB	Alloy Steel	Treated Water	Loss of Material	Fluid Leak Management Program
Handhole Pad Minor Nozzle Bosses (CNS – 2 only)	PB	Alloy Steel	Treated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Steam Generators (continued)					
Tubesheet/ primary and secondary cladding	PB	Alloy Steel Nickel Based Alloy Clad	Borated Water (primary)	Cracking Loss of Material (cladding)	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
			Treated Water (secondary)	Loss of Material	Chemistry Control Program
Tubes/plugs	PB	Nickel Based Alloy (Alloy 690) (CNS-2 – Alloy 600)	Borated Water (Primary Side)	Cracking Loss of Material	Chemistry Control Program Steam Generator Surveillance Program
			Treated Water (Secondary Side)	Cracking Loss of Material	Chemistry Control Program Steam Generator Surveillance Program
Primary Nozzles	PB	Alloy Steel Stainless Steel Clad (CNS-2 carbon steel w/ Stainless Steel Clad) (Nickel Based Alloy weld buttering)	Borated Water	Cracking Loss of Material (cladding)	Alloy 600 Aging Management Review (Note 3) Chemistry Control Program Inservice Inspection Plan

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Steam Generators (continued)					
Primary Nozzle Safe Ends (Note 3)	PB	Stainless Steel	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Primary Manway Cover Plate/Diaphragm (Note 3)	PB	Alloy Steel/ Nickel Based Alloy	Borated Water	Cracking Loss of Material	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Primary Divider Plate	PB	Nickel Based Alloy	Borated Water	Cracking Loss of Material	Alloy 600 Aging Management Review Chemistry Control Program Inservice Inspection Plan
Steam drum boiler shells, Steam dome conical shells handhole	PB	Alloy Steel	Treated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Handhole Diaphragm (Note 3)	PB	Nickel Based Alloy	Treated Water	Cracking Loss of Material	Chemistry Control Program

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Steam Generators (continued)					
Small Nozzles (Note 3)	PB	Nickel Based Alloy Alloy Steel Weld Buildup	Treated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Primary Manway and Manway Insert (CNS – 2 only)	PB	Carbon Steel Stainless Steel Clad	Borated Water	Cracking Loss of Material	Chemistry Control Program Inservice Inspection Plan
Primary Chamber Drain and Coupling (CNS – 2 only)	PB	Stainless Steel, Nickel based Alloy	Borated Water	Cracking Loss of Material	Alloy 600 Aging Management Review Chemistry Control Program
Feedwater Thermal Sleeve, Feedwater Limiter Steam Outlet Nozzle (CNS – 2 only)	PB	Nickel based Alloy	Treated Water	Cracking Loss of Material	Chemistry Control Program

Table 3.1-1 Aging Management Review Results – Reactor Coolant System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Steam Generators (continued)					
Flow Restrictor	PB,TH	Stainless Steel	Treated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Steam Outlet Nozzle Safe End (Note 3)	PB	Carbon Steel	Treated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Auxiliary Feedwater Nozzle Main Feedwater Nozzle Steam Outlet Nozzle	PB	Alloy Steel	Treated Water	Loss of Material Cracking	Chemistry Control Program Flow Accelerated Corrosion Program (Main Feedwater Nozzle) Inservice Inspection Plan
Auxiliary Feedwater Nozzle Safe End (Note 3)	PB	Nickel-Based Alloy	Treated Water	Loss of Material Cracking	Chemistry Control Program Inservice Inspection Plan
Auxiliary Feedwater Distribution System (Note 3)	PB	Alloy Steel	Treated Water	Loss of Material	Chemistry Control Program

Notes for Table 3.1-1 Aging Management Review Results – Reactor Coolant System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.
	Reactor Vessel Internals functions
1	Provide support and orientation of the reactor core (i.e. the fuel assemblies)
2	Provide support, orientation, guidance and protection of the control rod assemblies.
3	Provide a passageway for the distribution of the reactor coolant flow to the reactor core.
4	Provide a passageway for support, guidance, and protection for the incore instrumentation.
5	Provide secondary core support for limiting the downward displacement of the core support structure in the event of a postulated failure of the core barrel.
6	Provide neutron shielding to the reactor vessel and provide support for vessel material test specimens.
(2)	**Material**
	Alloy Steel refers to low alloy steel. Nickel Based Alloys include Inconel and Alloys 600 and 690.
CASS	Cast Austenitic Stainless Steel
(3)	The topic applies to McGuire Units 1 and 2 and to Catawba Unit 1 steam generators only.

This is the last page of Section 3.1

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES

Note: The aging management reviews for all engineered safety features systems are considered to be generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The following mechanical systems are evaluated in the indicated tables in Section 3.2, Engineered Safety Features:

- Annulus Ventilation System (Table 3.2-1)
- Containment Isolation System (Table 3.2-2)
- Containment Air Return & Hydrogen Skimmer System (Table 3.2-3)
- Containment Spray System (Table 3.2-4)
- Containment Valve Injection Water System (Table 3.2-5)
- Refueling Water System (Table 3.2-6)
- Residual Heat Removal System (Table 3.2-7)
- Safety Injection System (Table 3.2-8)

3.2.1 AGING MANAGEMENT REVIEW RESULTS TABLES

The results of the aging management review for each system of this section are provided in a table, as indicated above. Information contained in each table was obtained in the following manner:

Column 1 – The component types listed in Column 1 were identified through the screening methodology described in Section 2.1.2 of this application and are on the marked plant drawings identified in Section 2.3.2 of this application.

Column 2 – The component functions listed in Column 2 were obtained from plant specific engineering documents using the screening methodology described in Section 2.1.2.

Column 3 – The materials listed in Column 3 were obtained from the drawings identified in Section 2.3.2 of this application and other plant specific engineering documents.

Column 4 – The internal and external environments listed in Column 4 were obtained from plant specific engineering documents. External environments are also noted on the drawings identified in Section 2.3.2 of this application. These environments are as follows:

- **Air-Gas –** Compressed air is ambient air that has been filtered and compressed for use in plant equipment. Compressed air may be either dry or oiled. Compressed gases include carbon dioxide, hydrogen, nitrogen, Freon, or refrigeration gases used to replace Freon due to environmental concerns.

- **Borated Water –** Borated water is demineralized water treated with boric acid.

- **Raw Water –** Raw water is water from a lake, pond, or river that has been rough-filtered and possibly treated with a biocide.

- **Treated water –** Treated water is demineralized water that may be deareated, treated with a biocide or corrosion inhibitors, or a combination of these treatments. Treated water does not include borated water, which is evaluated separately.

- **Sheltered environment –** The ambient conditions within the sheltered environment may or may not be controlled. The sheltered environment atmosphere is a moist air environment. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

- **Reactor Building –** The Reactor Building environment is moist air. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

- **Ventilation** – Ambient air that is conditioned to maintain a suitable environment for equipment operation and personnel occupancy.

- **Yard –** Yard environment is a moist air environment in which equipment is exposed to heat, cold, and precipitation.

Column 5 – The aging effects listed in Column 5 were obtained using the following aging effects identification process. The aging effects that require management during the period of extended operation have been determined by reviewing the plant-specific materials of construction (Column 3) and operating environments (Column 4) for each structure and component (Column 1) that is subject to an aging management review.

To provide reasonable assurance that the aging effects that require management for a specific material-environment combination are the only aging effects of concern for McGuire and Catawba, Duke also performed a review of industry experience and NRC generic communications relative to these structures and components. Finally, relevant McGuire and Catawba operating experience have been reviewed to provide further confidence that the set of aging effects for the specific material-environment combinations have been identified. Taken together, the steps of this methodology provide reasonable assurance that the aging effects that require management during the period of extended operation for McGuire and Catawba structures and components have been identified.

This aging effects identification process is consistent with that process used in Section 3.5 of the Oconee Nuclear Station license renewal application. Furthermore, in NUREG-1723, the staff concluded that based on its review of the information provided in Sections 3.5.1 and 3.5.2 of the Oconee application, “the applicant has identified the aging effects that are associated with mechanical systems components reviewed in [Section 3.5].” This aging effects identification process provides reasonable assurance that the aging effects that require management during the period of extended operation have been identified.

Column 6 – The aging management programs and activities listed in Column 6 are credited to manage the effects of aging for the period of extended operation.

3.2.2 AGING MANAGEMENT PROGRAMS

The following aging management programs and activities are credited to manage the effects of aging for the engineered safety features systems listed in Section 3.2:

- Borated Water Systems Stainless Steel Inspection *
- Chemistry Control Program *
- Flow Accelerated Corrosion Program *
- Fluid Leak Management Program *
- Galvanic Susceptibility Inspection *
- Heat Exchanger Performance Testing Activities – Containment Spray Heat Exchangers
- Heat Exchanger Preventive Maintenance Activities – Containment Spray
- Inspection Program for Civil Engineering Structures and Components *
- Preventive Maintenance Activities – Refueling Water Storage Tank Internal Coating Inspection
- Service Water Piping Corrosion Program *
- Treated Water Systems Stainless Steel Inspection *

** This aging management program/activity is equivalent or similar to the corresponding program/activity that has been previously reviewed and found acceptable by the NRC staff during the Oconee License Renewal review, as documented in NUREG-1723.*

Based on the evaluations provided in Appendix B for the aging management programs and activities listed above, the aging effects will be adequately managed such that the intended functions of the components listed in Tables 3.2-1 through 3.2-8 will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.2-1 Aging Management Review Results – Annulus Ventilation System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Air Flow Monitors	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Ductwork	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Ductwork	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Filters	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Tubing	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	CU	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.2-1 Aging Management Review Results – Annulus Ventilation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required

Notes for Table 3.2-1 Aging Management Review Results – Annulus Ventilation System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR	Brass
CU	Copper
CS	Carbon Steel
SS	Stainless Steel

Table 3.2-2 Aging Management Review Results – Containment Isolation System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Breathing Air System					
Pipe	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Containment Air Release and Addition System					
Pipe (CNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Containment Air Release and Addition System (continued)					
Tubing (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Tubing (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies (CNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Containment Hydrogen Sample and Purge System (Catawba Nuclear Station)					
Orifice	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Containment Hydrogen Sample and Purge System (Catawba Nuclear Station) (continued)					
Pipe	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Tubing	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Tubing	PB	CU	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Containment Purge Ventilation System					
Pipe	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Containment Purge Ventilation System (continued)					
Tubing (CNS Only)	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Tubing (CNS Only)	PB	CU	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Tubing	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bodies (CNS Only)	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Containment Ventilation Cooling Water (McGuire Nuclear Station only)					
Annubars	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Annubars	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Raw Water	Loss of Material	Service Water Piping Corrosion Program Galvanic Susceptibility Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Containment Ventilation Cooling Water (McGuire Nuclear Station only)(continued)					
Tubing	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Containment Ventilation Cooling Water (McGuire Nuclear Station only)(continued)					
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Conventional Chemical Addition System (McGuire Nuclear Station only)					
Pipe	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Equipment Decontamination (Catawba Nuclear Station only)					
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Embedded	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Equipment Decontamination (Catawba Nuclear Station only)(continued)					
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Ice Condenser Refrigeration System					
Pipe	PB	CS	Treated Water (Note 3)	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Ice Condenser Refrigeration System (continued)					
Pipe	PB	CS	Treated Water (Note 3)	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (MNS only)	PB	CS	Ventilation (Note 5)	None Identified	None Required
			Embedded (Note 6)	None Identified	None Required
Pipe	PB	CS	Ventilation (Note 5)	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe (CNS only)	PB	SS	Ventilation	None Identified	None Required
			Embedded (Note 6)	None Identified	None Required
Pipe (MNS only)	PB	SS	Ventilation (Note 4)	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Ventilation (Note 4)	None Identified	None Required
			Reactor Building	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Ice Condenser Refrigeration System (continued)					
Pipe (MNS only)	PB	SS	Ventilation (Note 5)	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe	PB	Transite	Ventilation (Note 5)	None Identified	None Required
			Embedded (Note 6)	None Identified	None Required
Valve Bodies	PB	CS	Treated Water (Note 3)	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water (Note 3)	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Ice Condenser Refrigeration System (continued)					
Valve Bodies	PB	SS	Treated Water (Note 3)	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water (Note 3)	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies (MNS only)	PB	SS	Ventilation (Note 4)	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation (Notes 4, 5)	None Identified	None Required
			Reactor Building	None Identified	None Required
Make-up Demineralized Water System					
Pipe	PB	SS	Treated Water	Loss of Material Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Treated Water	Loss of Material Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Make-up Demineralized Water System (continued)					
Valve Bodies	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	
			Sheltered	None Identified	None Required
Station Air System					
Pipe	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (1)**	**Material (2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Steam Generator Blowdown Recycle System					
Pipe (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe (MNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steam Generator Blowdown Recycle System (continued)					
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (Catawba only)
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies (MNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steam Generator Wet Lay-Up Recirculation System					
Pipe (MNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-2 Aging Management Review Results – Containment Isolation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steam Generator Wet Lay-Up Recirculation System (continued)					
Valve Bodies (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.2-2 Aging Management Review Results – Containment Isolation System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
(2)	**Material**
BR	Brass
CU	Copper
CS	Carbon Steel
SS	Stainless Steel
Transite	Non-metallic cement-asbestos
(3)	50% weight/volume aqueous solution containing corrosion inhibitors is maintained between –5°F and 0°F.
(4)	Infrequent (temporary) exposure to either borated ice/air (~20°F) mixture or ~20°F air for ice loading components. Normal environment is ambient Reactor Building air. (McGuire only)
(5)	Also exposed infrequently to small amounts of spillage/defrost water, as well as ethylene glycol solution. Surface coated to minimize effects of sodium tetraborate. Environment is predominantly cold air from the ice condenser. (McGuire only)
(6)	Although external temperature is above freezing, a gradient consistent with the wear slab/structural subfloor temperature gradient is experienced (i.e. upper portions of embedded pipe are at a lower temperature than the lower portion which exits into the Reactor Building.)

Table 3.2-3 Aging Management Review Results – Containment Air Return & Hydrogen Skimmer System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Ductwork (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Expansion Joints (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Tubing (MNS Only)	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Tubing (MNS Only)	PB	CU	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Tubing (CNS Only)	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required

Table 3.2-3 Aging Management Review Results – Containment Air Return & Hydrogen Skimmer System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.2-3 Aging Management Review Results – Containment Air Return & Hydrogen Skimmer System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CU Copper
CS Carbon Steel
SS Stainless Steel

Table 3.2-4 Aging Management Review Results – Containment Spray System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Flow Orifices	TH, PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
McGuire Heat Exchangers 1NSHX0003, 1NSHX0004, and 2 NSHX0003					
Heat Exchangers (1NSHX0003, 1NSHX0004, 2NSHX0003) [Channel Head]	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	
		CS	Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchangers (NSHX0003, 1NSHX0004, 2NSHX0003) [Shell]	PB	CS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
		SS (Note 3)	Raw Water	Loss of Material	Service Water Piping Corrosion Program
		CS	Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-4 Aging Management Review Results – Containment Spray System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Heat Exchangers (NSHX0003, 1NSHX0004, 2NSHX0003) [Tubes]	PB, HT	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	
			Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Containment Spray
				Fouling	Heat Exchanger Performance Testing Activities – Containment Spray Heat Exchangers
Heat Exchangers (NSHX0003, 1NSHX0004, 2NSHX0003) [Tube Sheet]	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Raw Water	Loss of Material	Service Water Piping Corrosion Program
McGuire Heat Exchanger 2NSHX0004					
Heat Exchanger (2NSHX0004) [Channel Head]	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
		SS (Note 4)	Sheltered	None Identified	None Required
		CS (Note 4)	Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-4 Aging Management Review Results – Containment Spray System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
McGuire Heat Exchanger 2NSHX0004 (continued)					
Heat Exchanger (2NSHX0004) [Shell]	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	
		SS (Note 4)	Sheltered	None Identified	None Required
		CS (Note 4)	Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger (2NSHX0004) [Tubes]	PB, HT	TI	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Containment Spray
				Fouling	Heat Exchanger Performance Testing Activities – Containment Spray Heat Exchangers
			Borated Water	None Identified	None Required
Heat Exchanger (2NSHX0004) [Tubesheets]	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program

Table 3.2-4 Aging Management Review Results – Containment Spray System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Catawba Heat Exchangers					
Heat Exchangers [Channel Head]	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
		SS	Sheltered	None Identified	None Required
		CS (Note 5)	Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchangers [Shell]	PB	CS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchangers [Tubes]	PB, HT	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Containment Spray
				Fouling	Heat Exchanger Performance Testing Activities – Containment Spray Heat Exchangers

Table 3.2-4 Aging Management Review Results – Containment Spray System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Heat Exchangers [Tubesheet]	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
		CS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
Pipe	PB	SS	Borated Water (Note 6)	Loss of Material	Borated Water Systems Stainless Steel Inspection
				Cracking	
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Ventilation (Note 7)	None Identified	None Required
			Reactor Building	None Identified	None Required
Pump Casings	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Spray Nozzles	PB, SP	SS	Ventilation (Note 7)	None Identified	None Required
			Reactor Building	None Identified	None Required

Table 3.2-4 Aging Management Review Results – Containment Spray System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Borated Water	Loss of Material Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Ventilation (Note 7)	None Identified	None Required
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Ventilation (Note 7)	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Loss of Material Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation (Note 7)	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation (Note 7)	None Identified	None Required
			Reactor Building	None Identified	None Required

Notes for Table 3.2-4 Aging Management Review Results – Containment Spray System:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

SP Provide spray flow so that sufficient spray flow and/or flow pattern are maintained

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel
TI Titanium

(3) The shells of 1NSHX0003, 1NSHX0004 and 2NSHX0003 are constructed of carbon steel. However, certain nozzles on the shell cover are stainless steel, with an overlay on surrounding carbon steel shell material. Therefore, both a Carbon Steel/Raw Water and a Stainless Steel/Raw Water material/environment combination exist for these shells.

(4) Certain portions of heat exchanger sub-components have both Stainless Steel and Carbon Steel portions exposed to a Sheltered Environment.

(5) While the majority of the external surface of the heat exchanger sub-component is stainless steel, certain portions are carbon steel.

(6) Portions of subject pipe vertical risers inside the Reactor Building, are subject to an alternate wet/dry borated water environment as system fill level changes during discharge valve testing and due to downstream components being open to Reactor Building ambient air.

(7) Portions of subject pipe, valves and spray nozzles, although designed for borated water, are normally open to the Reactor Building ambient air (considered a Ventilation environment for license renewal considerations) since they are located above the expected elevation of the FWST, to which the Containment Spray system is directly connected. Additionally, tubing and valves associated with Containment pressure measurement are open to the Reactor Building ambient air.

Table 3.2-5 Aging Management Review Results – Containment Valve Injection Water System

(Catawba Nuclear Station only)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Pipe	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Reactor Building	None Identified	None Required
Tanks	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Tubing	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required

Table 3.2-5 Aging Management Review Results – Containment Valve Injection Water System (Catawba Nuclear Station only) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required

Notes for Table 3.2-5 Aging Management Review Results – Containment Valve Injection Water System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

SS Stainless Steel

Table 3.2-6 Aging Management Review Results – Refueling Water System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Expansion Joint (MNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Cracking (Note 3)	Borated Water Systems Stainless Steel Inspection
				Loss of Material (Note 3)	Borated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Cracking (Note 3)	Borated Water Systems Stainless Steel Inspection
				Loss of Material (Note 3)	Borated Water Systems Stainless Steel Inspection
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required

Table 3.2-6 Aging Management Review Results – Refueling Water System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Refueling Water Storage Tank (MNS only)	PB	CS	Ventilation	Loss of Material	Preventive Maintenance Activities – Refueling Water Storage Tank Internal Coating Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Refueling Water Storage Tank (MNS only)	PB	CS	Borated Water	Loss of Material	Preventive Maintenance Activities – Refueling Water Storage Tank Internal Coating Inspection
				Loss of Material (Note 3)	
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Refueling Water Storage Tank (CNS only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Cracking (Note 3)	Borated Water Systems Stainless Steel Inspection
				Loss of Material (Note 3)	Borated Water Systems Stainless Steel Inspection
			Yard	None Identified	None Required
Refueling Water Storage Tank (CNS only)	PB	SS	Ventilation	None Identified	None Required
			Yard	None Identified	None Required

Table 3.2-6 Aging Management Review Results – Refueling Water System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Cracking (Note 3)	Borated Water Systems Stainless Steel Inspection
				Loss of Material (Note 3)	Borated Water Systems Stainless Steel Inspection
			Reactor Building	None Identified	None Required

Table 3.2-6 Aging Management Review Results – Refueling Water System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
					Chemistry Control Program
				Cracking (Note 3)	Borated Water Systems Stainless Steel Inspection
				Loss of Material (Note 3)	Borated Water Systems Stainless Steel Inspection
					Borated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Valve Bodies (MNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required

Notes for Table 3.2-6 Aging Management Review Results – Refueling Water System:

(1) Component Function

HT	Provide heat transfer so that system and/or component operating temperatures are maintained.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS	Carbon Steel
SS	Stainless Steel

(3) Component subject to alternate wetting and drying

Table 3.2-7 Aging Management Review Results – Residual Heat Removal System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Heat Exchangers, RHR (tubes)	PB, HT	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
Heat Exchangers, RHR (tube sheet)	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
Heat Exchangers, RHR (channel head)	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Heat Exchangers, RHR (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-7 Aging Management Review Results – Residual Heat Removal System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
RHR Pump Seal Water (tubes)	PB, HT	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
RHR Pump Seal Water (shell)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifices	PB, TH	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Heat Exchanger RHR Pump Seal Water (cover) (CNS only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-7 Aging Management Review Results – Residual Heat Removal System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Orifices (All others)	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Pump Casings, RHR	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-7 Aging Management Review Results – Residual Heat Removal System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.2-7 Aging Management Review Results – Residual Heat Removal System:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.2-8 Aging Management Review Results – Safety Injection System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB, TH	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Orifices	PB,TH	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Air-Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-8 Aging Management Review Results – Safety Injection System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Air-Gas	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Safety Injection Cold Leg Accumulators (eight)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
		CS	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Safety Injection Cold Leg Accumulators (eight)	PB	SS	Air-Gas	None Identified	None Required
		CS	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Safety Injection Pump Casings (four)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.2-8 Aging Management Review Results – Safety Injection System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Air-Gas	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.2-8 Aging Management Review Results – Safety Injection System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Valve Bodies	PB	CS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Reactor Building	None Identified	None Required

Notes for Table 3.2-8 Aging Management Review Results – Safety Injection System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel

This is the last page of Section 3.2

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

Note: The aging management reviews for all auxiliary systems are considered to be generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The following mechanical systems are evaluated in the indicated tables in Section 3.3, Auxiliary Systems:

- Auxiliary Building Ventilation System (Table 3.3-1)
- Boron Recycle System (Table 3.3-2)
- Building Heating Water System – Catawba Nuclear Station (Table 3.3-3)
- Chemical & Volume Control System – McGuire Nuclear Station (Table 3.3-4)
- Chemical & Volume Control System – Catawba Nuclear Station (Table 3.3-5)
- Component Cooling System – McGuire Nuclear Station (Table 3.3-6)
- Component Cooling System – Catawba Nuclear Station (Table 3.3-7)
- Condenser Circulating Water System (Table 3.3-8)
- Control Area Chilled Water Systems – McGuire Nuclear Station (Table 3.3-9)
- Control Area Chilled Water Systems – Catawba Nuclear Station (Table 3.3-10)
- Control Area Ventilation (Table 3.3-11)
- Conventional Wastewater Treatment System (Table 3.3-12)
- Diesel Building Ventilation System (Table 3.3-13)
- Diesel Generator Air Intake and Exhaust System (Table 3.3-14)
- Diesel Generator Cooling Water System – McGuire Nuclear Station (Table 3.3-15)
- Diesel Generator Cooling Water System – Catawba Nuclear Station (Table 3.3-16)
- Diesel Generator Crankcase Vacuum System (Table 3.3-17)
- Diesel Generator Fuel Oil System – McGuire Nuclear Station (Table 3.3-18)
- Diesel Generator Fuel Oil System – Catawba Nuclear Station (Table 3.3-19)
- Diesel Generator Lube Oil System – McGuire Nuclear Station (Table 3.3-20)
- Diesel Generator Lube Oil System – Catawba Nuclear Station (Table 3.3-21)
- Diesel Generator Room Sump Pump System (Table 3.3-22)
- Diesel Generator Starting Air System – McGuire Nuclear Station (Table 3.3-23)
- Diesel Generator Starting Air System – Catawba Nuclear Station (Table 3.3-24)
- Drinking Water System – Catawba Nuclear Station (Table 3.3-25)
- Fire Protection System – McGuire Nuclear Station (Table 3.3-26)
- Fire Protection System – Catawba Nuclear Station (Table 3.3-27)
- Fuel Handling Area Ventilation System – Catawba Nuclear Station (Table 3.3-28)
- Fuel Handling Building Ventilation System – McGuire Nuclear Station (Table 3.3-28)
- Groundwater Drainage System (Table 3.3-29)

- Heating Water System – McGuire Nuclear Station (Table 3.3-3)
- Hydrogen Bulk Storage System (Table 3.3-30)
- Instrument Air System (Table 3.3-31)
- Liquid Radwaste System (Table 3.3-32)
- Liquid Waste Recycle System (Table 3.3-32)
- Liquid Waste Monitor and Disposal System (Table 3.3-32)
- Miscellaneous Structures Ventilation System (Table 3.3-33)
- Nitrogen System (Table 3.3-34)
- Nuclear Sampling System (Table 3.3-35)
- Nuclear Service Water System – McGuire Nuclear Station (Table 3.3-36)
- Nuclear Service Water System – Catawba Nuclear Station (Table 3.3-37)
- Nuclear Service Water Pump Structure Ventilation System (Table 3.3-38)
- Nuclear Solid Waste Disposal System (Table 3.3-39)
- Reactor Coolant Pump Motor Oil Collection Sub-System (Table 3.3-40)
- Reactor Coolant System (Non-Class 1 Components) (Table 3.3-41)
- Recirculated Cooling Water System – Catawba Nuclear Station (Table 3.3-42)
- Solid Radwaste System (Table 3.3-39)
- Spent Fuel Cooling System (Table 3.3-43)
- Standby Shutdown Diesel (Table 3.3-44)
- Turbine Building Sump Pump System (Table 3.3-45)
- Turbine Building Ventilation System (Table 3.3-46)
- Waste Gas System (Table 3.3-47)

3.3.1 AGING MANAGEMENT REVIEW RESULTS TABLES

The results of the aging management review for each system of this section is provided a table, as indicated above. Information contained in each table was obtained in the following manner:

Column 1 – The component types listed in Column 1 were identified through the screening methodology described in Section 2.1.2 of this application and are on the marked plant drawings identified in Section 2.3.4 of this application.

Column 2 – The component functions listed in Column 2 were obtained from plant specific engineering documents using the screening methodology described in Section 2.1.2.

Column 3 – The materials listed in Column 3 were obtained from the drawings identified in Section 2.3.4 of this application and other plant specific engineering documents.

Column 4 – The internal and external environments listed in Column 4 were obtained from plant specific engineering documents. External environments are also noted on the drawings identified in Section 2.3.4 of this application. These environments are as follows:

- **Air-Gas –** Compressed air is ambient air that has been filtered and compressed for use in plant equipment. Compressed air may either be either dry or oiled. Compressed gases include carbon dioxide, hydrogen, nitrogen, Freon, or refrigeration gases used to replace Freon due to environmental concerns.

- **Borated Water –** Borated water is demineralized water treated with boric acid.

- **Embedded Environment –** A component encased in concrete is in an embedded environment. The concrete forms a tight seal around the external surfaces of the component.

- **Oil and Fuel Oil –** Lubricating oil is an organic fluid used to reduce friction between moving parts. Fuel oil is the fuel used for the emergency diesel generators.

- **Raw Water –** Raw water is water from a lake, pond, or river that has been rough-filtered and possibly treated with a biocide.

- **Reactor Building –** The Reactor Building environment atmosphere is a moist air environment. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

- **Sheltered Environment –** The ambient conditions within the sheltered environment may or may not be controlled. The sheltered environment atmosphere is a moist air environment. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

- **Treated water –** Treated water is demineralized water that may be deareated, treated with a biocide or corrosion inhibitors, or a combination of these treatments. Treated water does not include borated water, which is separately evaluated.

- **Underground Environment –** Components in an underground environment are in contact with soil and possibly groundwater. Components located underground are normally coated and wrapped to prevent the soil and groundwater from contacting the surface of the component.

- **Ventilation –** Ambient air that is conditioned to maintain a suitable environment for equipment operation and personnel occupancy.

- **Yard –** Yard environment is a moist air environment in which equipment is exposed to heat, cold, and precipitation.

Column 5 – The aging effects listed in Column 5 were obtained using the following aging effects identification process. The aging effects that require management during the period of extended operation have been determined by reviewing the plant-specific materials of construction (Column 3) and operating environments (Column 4) for each structure and component (Column 1) that is subject to an aging management review.

To provide reasonable assurance that the aging effects that require management for a specific material-environment combination are the only aging effects of concern for McGuire and Catawba, Duke also has performed a review of industry experience and NRC generic communications relative to these structures and components. Finally, relevant McGuire and Catawba operating experience have been reviewed to provide further confidence that the set of aging effects for the specific material-environment combinations have been identified. Taken together, the steps of this methodology provide reasonable assurance that the aging effects that require management during the period of extended operation for McGuire and Catawba structures and components have been identified.

This aging effects identification process is consistent with that process that had been used in Section 3.5 of the Oconee Nuclear Station license renewal application. Furthermore, in NUREG-1723, the staff concluded that based on its review of the information provided in Sections 3.5.1 and 3.5.2 of the Oconee application, "the applicant has identified the aging effects that are associated with mechanical systems components reviewed in [Section 3.5]." This aging effects identification process provides reasonable assurance that the aging effects that require management during the period of extended operation have been identified.

Column 6 – The aging management programs and activities listed in Column 6 are credited to manage the effects of aging for the period of extended operation.

3.3.2 AGING MANAGEMENT PROGRAMS

The following aging management programs and activities are credited to manage the effects of aging for the auxiliary systems listed in Section 3.3:

- Chemistry Control Program *
- Fire Protection Program*
- Flow Accelerated Corrosion Program *
- Fluid Leak Management Program *
- Galvanic Susceptibility Inspection *
- Heat Exchanger Preventive Maintenance Activities – Component Cooling
- Heat Exchanger Preventive Maintenance Activities – Diesel Generator Engine Cooling Water
- Heat Exchanger Preventive Maintenance Activities – Diesel Generator Engine Starting Air
- Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
- Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
- Heat Exchanger Preventive Maintenance – Control Area Chilled Water
- Inspection Program for Civil Engineering Structures and Components *
- Liquid Waste System Inspection
- Preventive Maintenance Activities – Condenser Circulating Water Systems Internal Coatings Inspection
- Performance Testing Activities – Component Cooling Heat Exchangers
- Performance Testing Activities – Diesel Engine Cooling Water Heat Exchanger
- Performance Testing Activities – Diesel Generator Engine Cooling Water Heat Exchanger
- Selective Leaching Inspection*
- Service Water Piping Corrosion Program*
- Sump Pump System Inspection
- Treated Water Systems Stainless Steel Inspection*
- Waste Gas System Inspection

* *This aging management program/activity is equivalent to the corresponding program/activity that has been previously reviewed and found acceptable by the NRC staff during the Oconee License Renewal review, as documented in NUREG-1723.*

Based on the evaluations provided in Appendix B for the aging management programs and activities listed above, the aging effects will be adequately managed such that the intended functions of the components listed in Tables 3.3-1 through 3.3-40 will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.3-1 Aging Management Review Results – Auxiliary Building Ventilation System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Air Flow Monitors	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Containment Spray Pump Motor Air Handling Unit (Plenum Assembly) (MNS Only)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Containment Spray Pump Motor Air Handling Unit (Tubes) (MNS Only)	HT, PB	Cu	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
			Ventilation	None Identified	None Required
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Filter	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-1 Aging Management Review Results – Auxiliary Building Ventilation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Fuel Pool Cooling Pump Air Handling Unit (Plenum Assembly) (MNS Only)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Fuel Pool Cooling Pump Air Handling Unit (Tubes) (MNS Only)	HT, PB	Cu	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
			Ventilation	None Identified	None Required
Residual Heat Removal Pump Motor Air Handling Unit (Plenum Assembly) (MNS Only)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Residual Heat Removal Pump Motor Air Handling Unit (Tubes) (MNS Only)	HT, PB	Cu	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Motor Air Handling Units
			Ventilation	None Identified	None Required

Table 3.3-1 Aging Management Review Results – Auxiliary Building Ventilation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pump Room Heater-Demister (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Shutdown Panel Area Air Conditioning Unit Condenser (tubes) (CNS Only)	HT, PB	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Gas (Freon-22)	None Identified	None Required
Shutdown Panel Area Air Conditioning Unit Condenser (tube sheets) (CNS Only)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Gas (Freon-22)	None Identified	None Required
Shutdown Panel Area Air Conditioning Unit Condenser (shells) (CNS Only)	PB	CS	Gas (Freon-22)	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-1 Aging Management Review Results – Auxiliary Building Ventilation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Shutdown Panel Area Air Conditioning Unit Condenser (tube-side bonnet) (CNS Only)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Shutdown Panel Area Air Handling Unit (CNS Only)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Shutdown Panel Area Heaters (CNS Only)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	Cu	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-1 Aging Management Review Results – Auxiliary Building Ventilation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program

Notes for Table 3.3-1 Aging Management Review Results – Auxiliary Building Ventilation System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CS Carbon Steel
Cu Copper
Cu-Ni Copper-Nickel
GS Galvanized Steel
SS Stainless Steel

Table 3.3-2 Aging Management Review Results – Boron Recycle System
(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Eductors (MNS)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Filters	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Flow Meters	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices (CNS)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-2 Aging Management Review Results – Boron Recycle System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe (MNS Only)	PB	CS	Air-Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-2 Aging Management Review Results – Boron Recycle System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Recycle Evaporative Feed Demineralizers	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Recycle Holdup Tanks	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Strainers (CNS)	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-2 Aging Management Review Results – Boron Recycle System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies (MNS Only)	PB	CS	Air-Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Air-Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-2 Aging Management Review Results – Boron Recycle System:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel

(3) Component subject to alternate wetting and drying which may concentrate contaminants

Table 3.3-3 Aging Management Review Results – Building Heating Water System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (CNS only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-3 Aging Management Review Results – Building Heating Water System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Boric Acid Blenders	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boric Acid Filters	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boric Acid Tank	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boric Acid Tank	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Boric Acid Transfer Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boron Meters	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Cation Bed Demineralizer Resin Traps	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Cation Bed Demineralizers	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Centrifugal Charging Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Excess Letdown Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Excess Letdown Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Excess Letdown Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Excess Letdown Heat Exchanger (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Flow Meters (Turbine Meters)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Letdown Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Letdown Heat Exchanger (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Letdown Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Letdown Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Mixed Bed Demineralizers	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Mixed Bed Demineralizer Resin Traps	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifice	PB, TH	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Reactor Coolant Filters	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Accumulators (non-wetted)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Accumulators (wetted)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Suction Stabilizers	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Regenerative Heat Exchangers (shell)	PB	CASS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Regenerative Heat Exchangers (channel head)	PB	CASS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Regenerative Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Regenerative Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Regenerative Heat Exchangers (Interconnecting Piping)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Seal Water Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Seal Water Heat Exchanger (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Seal Water Heat Exchanger (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Seal Water Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Seal Water Injection Filters	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Seal Water Return Filters	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Spray Nozzles (Volume Control Tank)	SP, PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required
Standby Makeup Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Standby Makeup Pump Filters	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Standby Makeup Pump Pulsation Dampener (non-wetted)	PB	CS	Gas	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Standby Makeup Pump Pulsation Dampener (wetted)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Standby Makeup Pump Suction Dampener (non-wetted)	PB	SS	Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Standby Makeup Pump Suction Dampener (wetted)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Volume Control Tanks	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Volume Control Tanks	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-4 Aging Management Review Results – Chemical & Volume Control System (McGuire Nuclear Station):

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
SP Provide spray flow so that sufficient spray flow and/or flow pattern are maintained.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CASS Cast Austenitic Stainless Steel (SA351-CF8)
CS Carbon Steel
SS Stainless Steel

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Boric Acid Blenders	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boric Acid Recirculating Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boric Acid Tank	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boric Acid Tank	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Boric Acid Transfer Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Boron Meters	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Cation Bed Demineralizers	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Centrifugal Charging Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Excess Letdown Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Excess Letdown Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Excess Letdown Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Excess Letdown Heat Exchanger (shell)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Filters	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Flow Meters	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Letdown Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Letdown Heat Exchanger (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Letdown Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Letdown Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Mixed Bed Demineralizers	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifice	PB, TH	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB, TH	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Reciprocating Charging Pump Discharge Pulsation Dampeners (bellows exterior)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Discharge Pulsation Dampeners (bellows interior)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Suction Pulsation Dampeners (bellows exterior)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Reciprocating Charging Pump Suction Pulsation Dampeners (bellows interior)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Regenerative Heat Exchangers (channel head)	PB	CASS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Regenerative Heat Exchangers (interconnecting piping)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Regenerative Heat Exchangers (shell)	PB	CASS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Regenerative Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Regenerative Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Seal Water Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Seal Water Heat Exchanger (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Seal Water Heat Exchangers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Seal Water Heat Exchangers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Standby Makeup Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Standby Makeup Pump Discharge Strainer	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Standby Makeup Suction Pulsation Dampener (bellows exterior)	PB	SS	Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Standby Makeup Suction Pulsation Dampener (bellows interior)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Strainers (simplex)	PB, FI	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Unit 1 Standby Makeup Discharge Pulsation Dampener (bellows exterior)	PB	SS	Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Unit 1 Standby Makeup Discharge Pulsation Dampener (bellows interior)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Unit 2 Standby Makeup Discharge Pulsation Dampener (bellows exterior)	PB	CS	Gas	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Unit 2 Standby Makeup Discharge Pulsation Dampener (bellows interior)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Volume Control Tank Spray Nozzles	SP, PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Volume Control Tanks	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Volume Control Tanks	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-5 Aging Management Review Results – Chemical & Volume Control System (Catawba Nuclear Station):

(1)	**Component Function**
FI	Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
SP	Provide spray flow so that sufficient spray flow and/or flow pattern are maintained.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2)	**Material**
CASS	Cast Austenitic Stainless Steel (SA351-CF8)
CS	Carbon Steel
SS	Stainless Steel

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Flexible Hose	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Flexible Hose	PB	Inconel 625	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Heat Exchanger, KC (tubes)	PB, HT	Admiralty Brass	Raw Water	Fouling	Performance Testing Activities – Component Cooling Heat Exchanger
				Loss of Material	Heat Exchanger Preventive Maintenance Activities - Component Cooling
			Treated Water	Cracking	Chemistry Control Program
				Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, KC (tube sheet)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities - Component Cooling
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, KC (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, KC (channel head)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities - Component Cooling
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB evaporator package evaporator condenser (tubes)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB evaporator package evaporator condenser (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB evaporator package evaporator condenser (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB evaporator package distillate cooler (tubes)	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB evaporator package distillate cooler (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB evaporator package distillate cooler (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB evaporator package vent condenser (tubes)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB evaporator package vent condenser (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB evaporator package vent condenser (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NC pump motor upper bearing oil cooler (tubes)	PB	Cu	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, NC pump motor upper bearing oil cooler (tube sheet)	PB	Tube side – Cu alloy	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
		Shell side – CS	Oil	None Identified	None Required

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NC pump motor upper bearing oil cooler (shell)	PB	CS	Oil	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NC pump motor upper bearing oil cooler (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NC pump motor lower bearing oil cooler (tubes)	PB	Cu-Ni	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, WL reactor coolant drain tank (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, WL reactor coolant drain tank (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, WL reactor coolant drain tank (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NM steam generator blowdown sample (tubes)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NM steam generator blowdown sample (manifold)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NM steam generator blowdown sample (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NM pressurizer sample (tubes)	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NM pressurizer sample (manifold)	PB	SS	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
Heat Exchanger, NM pressurizer sample (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NM residual heat removal loop sample (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NM residual heat removal loop sample (manifold)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NM residual heat removal loop sample (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NM reactor coolant hot leg sample (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NM reactor coolant hot leg sample (manifold)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NM reactor coolant hot leg sample (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, WG compressor package (tubes)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, WG compressor package (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, WG compressor package (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, WL waste evaporator package vent condenser (tubes)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Liquid Waste System Inspection
				Cracking	Liquid Waste System Inspection
Heat Exchanger, WL waste evaporator package vent condenser (tube sheet)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Treated Water	Loss of Material	Liquid Waste System Inspection
				Cracking	Liquid Waste System Inspection

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station

(continued)

1	2	3	4	5	6
Component Type (Note 1)	Component Function (Note 2)	Material (Note 3)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Heat Exchanger, WL waste evaporator package vent condenser (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, WL waste evaporator package distillate cooler (tubes)	PB	SS	Treated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, WL waste evaporator package distillate cooler (tube sheet)	PB	SS	Treated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, WL waste evaporator package distillate cooler (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, WL waste evaporator package evaporator condenser (tubes)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
Heat Exchanger, WL waste evaporator package evaporator condenser (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, WL waste evaporator package evaporator condenser (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifice	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifice	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pump Casing, KC	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Tank, KC Surge	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tank, KC Surge	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tank, KC Surge	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water (Alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-6 Aging Management Review Results – Component Cooling System (McGuire Nuclear Station):

(1) **System Abbreviations -** The following system abbreviations are used in the component type designations:
KC – Component Cooling Water System
NB – Boron Recycle System
NC – Reactor Coolant System
NM – Nuclear Sampling System
WG – Waste Gas System
WL – Liquid Waste Recycle System

(2) **Component Function**

HT	Provide heat transfer so that system and/or component operating temperatures are maintained.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(3) **Material**

CS	Carbon Steel
CU	Copper
Cu-Ni	Copper-Nickel Alloy
SS	Stainless Steel

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Annubar Tube	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Flexible Hose	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Flexible Hose	PB	Inconel 625	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Heat Exchanger, CA Pump Motor Cooler (tubes)	PB, HT	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
				Fouling	Chemistry Control Program
			Ventilation	None Identified	None Required
Heat Exchanger, CA Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, CA Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, CA Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Heat Exchanger, KC – 1A, 2B (tubes)	PB, HT	SS	Raw Water	Fouling	Performance Testing Activities – Component Cooling Heat Exchangers
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Component Cooling
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, KC – 1B, 2A (tubes)	PB, HT	Admiralty Brass	Raw Water	Fouling	Performance Testing Activities – Component Cooling Heat Exchangers
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Component Cooling
			Treated Water	Cracking	Chemistry Control Program
				Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, KC (tube sheet)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Component Cooling
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, KC (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, KC (channel head)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Component Cooling
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, KC Pump Motor Cooler (tubes)	PB, HT	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
				Fouling	Chemistry Control Program
			Ventilation	None Identified	None Required
Heat Exchanger, KC Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, KC Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, KC Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Heat Exchanger, KF Pump Motor Cooler (tubes)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Heat Exchanger, KF Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, KF Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, KF Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Heat Exchanger, NB Evaporator Concentrates (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB Evaporator Concentrates (manifold)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB Evaporator Concentrates (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB Evaporator Concentrates Pump Bearing Coolers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB Evaporator Concentrates Pump Bearing Coolers (manifold)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB Evaporator Concentrates Pump Bearing Coolers (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB Evaporator Concentrates Sample Coolers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB Evaporator Concentrates Sample Coolers (manifold)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB Evaporator Package Evaporator Condensers (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB Evaporator Concentrates Sample Coolers (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB Evaporator Package Evaporator Condensers (tubes)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB Evaporator Package Evaporator Condensers (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB Evaporator Package Distillate Coolers (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB Evaporator Package Distillate Coolers (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB Evaporator Package Distillate Coolers (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NB Evaporator Package Ventilation Condensers (tubes)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, NB Evaporator Package Ventilation Condensers (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NB Evaporator Package Ventilation Condensers (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NC Pump Motor Upper Bearing Oil Cooler (tubes)	PB	Cu	Treated Water	Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, NC Pump Motor Upper Bearing Oil Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Oil	None Identified	None Required
Heat Exchanger, NC Pump Motor Upper Bearing Oil Cooler (shell)	PB	CS	Oil	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NC Pump Motor Upper Bearing Oil Cooler (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NC Pump Motor Lower Bearing Oil Cooler (tubes)	PB	Cu	Treated Water	Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, ND Pump Motor Cooler (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, ND Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, ND Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, ND Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NS Pump Motor Cooler (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Heat Exchanger, NS Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NS Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components Fluid Leak Management Program
Heat Exchanger, NS Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Heat Exchanger, NI Pump Motor Cooler (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NI Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NI Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NI Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Heat Exchanger, NV Pump Motor Cooler (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NV Pump Motor Cooler (tube sheet)	PB	Cu-Ni (tube side)	Treated Water	Loss of Material	Chemistry Control Program
		CS (shell side)	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NV Pump Motor Cooler (shell)	PB	CS	Ventilation	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, NV Pump Motor Cooler (channel head)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Heat Exchanger, NV Centrifugal Charging Pump Bearing Oil Coolers (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NV Centrifugal Charging Pump Bearing Oil Coolers (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, NV Centrifugal Charging Pump Bearing Oil Coolers (shell)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Heat Exchanger, NV Centrifugal Charging Pump Bearing Oil Coolers (channel head)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Heat Exchanger, NV Centrifugal Charging Pump Speed Reducer Oil Coolers (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NV Centrifugal Charging Pump Speed Reducer Oil Coolers (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, NV Centrifugal Charging Pump Speed Reducer Oil Coolers (shell)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Heat Exchanger, NV Centrifugal Charging Pump Speed Reducer Oil Coolers (channel head)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Heat Exchanger, NI Pump Bearing Oil Coolers (tubes)	PB, HT	Cu-Ni	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Heat Exchanger, NI Pump Bearing Oil Coolers (tube sheet)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, NI Pump Bearing Oil Coolers (shell)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Heat Exchanger, NI Pump Bearing Oil Coolers (channel head)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Heat Exchanger, WL Reactor Coolant Drain Tank (tubes)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchanger, WL Reactor Coolant Drain Tank (tube sheet)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchanger, WL Reactor Coolant Drain Tank (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifices	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil (Note 4)	None Identified	None Required
Pump Casing, KC	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Tank, KC Surge	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tank, KC Surge	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tank, KC Surge	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type (Note 1)	**Function (Note 2)**	**Material (Note 3)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water (alternate wet/dry)	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil (Note 4)	None Identified	None Required

Notes for Table 3.3-7 Aging Management Review Results – Component Cooling System (Catawba Nuclear Station)

(1) **System Abbreviations -** The following system abbreviations are used in the component type designations:
CA – Auxiliary Feedwater System
KC – Component Cooling Water System
KF – Fuel Pool Cooling System
NB – Boron Recycle System
NC – Reactor Coolant System
ND – Residual Heat Removal System
NI – Safety Injection System
NM – Nuclear Sampling System
NS – Containment Spray System
NV – Chemical & Volume Control System
WL – Liquid Waste Recycle System

(2) **Component Function**

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(3) **Material**

CS Carbon Steel
CU Copper
Cu-Ni Copper-Nickel Alloy
SS Stainless Steel

(4) Plug valve located inside oil enclosure for RCP motor upper bearing oil cooler.

Table 3.3-8 Aging Management Review Results – Condenser Circulating Water System

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Embedded	None Identified	None Required
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe (Catawba only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Underground	Loss of Material	Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection

Table 3.3-8 Aging Management Review Results – Condenser Circulating Water System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe (Catawba only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pump Casing (Catawba Only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Strainer (Catawba only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-8 Aging Management Review Results – Condenser Circulating Water System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies (Catawba only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-8 Aging Management Review Results – Condenser Circulating Water System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Chemical Feeders	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Chemical Feeders	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Chemical Feeders	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Chemical Feeders	PB	CI	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Area Chilled Water Pump Casings	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Area Chilled Water Pump Casings	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Condenser Tubes)	HT, PB	Cu-Ni	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities-Control Area Chilled Water
				Loss of Material	Heat Exchanger Preventive Maintenance Activities-Control Area Chilled Water
			Gas	None Identified	None Required

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Condenser Tube Sheets)	PB	Cu-Ni	Raw Water	Loss of Material	Service Water Piping Corrosion Program
		CS	Gas	None Identified	None Required
Control Room Area Chiller (Condenser Shells)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Condenser Channel Heads)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities-Control Area Chilled Water
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Economizers)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Evaporator Tubes)	HT, PB	Cu	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required
Control Room Area Chiller (Evaporator Tube Sheets)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required
Control Room Area Chiller (Evaporator Channel Heads)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Evaporator Shells)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Oil Cooler Tubes)	PB	AB	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Control Room Area Chiller (Oil Cooler Tube Sheets)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Control Room Area Chiller (Oil Cooler Channel Heads)	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Oil Cooler Shells)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Oil Filters)	PB	CI	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Oil Filters)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Oil Separators)	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Pump Out Condenser Tubes)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required
Control Room Area Chiller (Pump Out Condenser Tube Sheets)	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
		CS	Gas	None Identified	None Required
Control Room Area Chiller (Pump Out Condenser Channel Heads)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Pump Out Condenser Shells)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Storage Tanks)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Compression Tanks	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Compression Tanks	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Flow Indicators	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifices	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Strainers	FI, PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-9 Aging Management Review Results – Control Area Chilled Water System (McGuire Nuclear Station):

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

AB Admiralty Brass
CI Cast Iron
CS Carbon Steel
Cu Copper
Cu-Ni Copper-Nickel Alloy
SS Stainless Steel

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chilled Water Pump Casings	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chilled Water Pump Casings	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Compression Tanks	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Compression Tanks	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Inspection For Civil Engineering Structures and Components
Control Room Area Chiller (Condenser tubes)	HT, PB	Cu-Ni	Raw Water	Fouling	Heat Exchanger Preventive Maintenance – Control Area Chilled Water
				Loss of Material	Heat Exchanger Preventive Maintenance – Control Area Chilled Water
			Gas	None Identified	None Required
Control Room Area Chiller (Condenser tube sheets)	PB	Cu-Ni	Raw Water	Loss of Material	Service Water Piping Corrosion Program
		CS	Gas	None Identified	None Required
Control Room Area Chiller (Condenser shells)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Condenser channel heads)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance – Control Area Chilled Water
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Economizers)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Evaporator tubes)	HT, PB	Cu	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required
Control Room Area Chiller (Evaporator tube sheets)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Evaporator Channel Heads)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Evaporator shells)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Oil Cooler tubes)	PB	AB	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Oil Cooler tube sheets)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Control Room Area Chiller (Oil Cooler Channel Heads)	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Oil Cooler Shells)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Oil Filters)	FI, PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Oil Separators)	FI, PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Pump Out Condenser tubes)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
			Gas	None Identified	None Required
Control Room Area Chiller (Pump Out Condenser tube sheets)	PB	Cu-Ni	Treated Water	Loss of Material	Chemistry Control Program
		CS	Gas	None Identified	None Required
Control Room Area Chiller (Pump Out Condenser Channel Heads)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Control Room Area Chiller (Pump Out Condenser Shells)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Control Room Area Chiller (Refrigerant Filters)	FI, PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Control Room Area Chiller (Storage Tanks)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifices	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Orifices	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Y-Strainers	FI, PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-10 Aging Management Review Results – Control Area Chilled Water System (Catawba Nuclear Station)

:

(1)	**Component Function**
FI	Provide filtration of process fluid so that downstream equipment and/or environments are protected.
HT	Provide heat transfer so that system and/or component operating temperatures are maintained.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2)	**Material**
AB	Admiralty Brass
CI	Cast Iron
CS	Carbon Steel
Cu-Ni	Copper-Nickel Alloy
SS	Stainless Steel

Table 3.3-11 Aging Management Review Results – Control Area Ventilation System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Air Handling Units (Heat Exchangers) (shells)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Air Handling Units (Heat Exchangers) (tube sheets)	PB	SS – MNS CS – CNS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Air Handling Units (Heat Exchangers) (tubes) (CNS Only)	HT, PB	Cu	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Air Handling Units (Heat Exchangers) (tubes) (MNS Only)	HT, PB	SS	Treated Water	Cracking	Chemistry Control Program
				Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Control Room Area Pressurizing Filter Trains (CNS Only)	FI, PB	SS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program

Table 3.3-11 Aging Management Review Results – Control Area Ventilation System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Ductwork (CNS Only)	PB	GS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Filter Trains (MNS Only)	FI, PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Orifices (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pre-Filters (MNS Only)	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	Cu	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program

Table 3.3-11 Aging Management Review Results – Control Area Ventilation System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note1)	Material (Note2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-11 Aging Management Review Results – Control Area Ventilation System:

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CS Carbon Steel
Cu Copper
GS Galvanized Steel
SS Stainless Steel

Table 3.3-12 Aging Management Review Results – Conventional Wastewater Treatment System (McGuire Nuclear Station Only)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump Systems Inspection
			Embedded	None Identified	None Required
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump Systems Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Standby Shutdown Facility Sump Pump Casing	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Selective Leaching Inspection Sump Pump Systems Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-12 Aging Management Review Results – Conventional Wastewater Treatment System (McGuire Nuclear Station Only) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump Systems Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-12 Aging Management Review Results – Conventional Wastewater Treatment System (McGuire Nuclear Station Only):

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
CI Cast Iron

Table 3.3-13 Aging Management Review Results – Diesel Building Ventilation System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	BR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	Cu	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-13 Aging Management Review Results – Diesel Building Ventilation System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2)	**Material**
BR	Brass
CS	Carbon Steel
Cu	Copper
GS	Galvanized Steel
SS	Stainless Steel

Table 3.3-14 Aging Management Review Results – Diesel Generator Air Intake and Exhaust System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Exhaust Silencers	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Intake Air Filters (CNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Intake Air Silencers	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Intake Flexible Connector (MNS Only)	PB	Rubber	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Expansion Joints	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Flexible Hoses (CNS Only)	PB	CR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-14 Aging Management Review Results – Diesel Generator Air Intake and Exhaust System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies (CNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-14 Aging Management Review Results – Diesel Generator Air Intake and Exhaust System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2)	**Material**
CR	Composite Rubber (ethylene propylene)
CS	Carbon Steel
Rubber	Rubber 45 Neoprene and Cloth
SS	Stainless Steel

Table 3.3-15 Aging Management Review Results – Diesel Generator Cooling Water System (McGuire Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Annubars	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
D/G Cooling Water Surge Tanks	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
				Loss of Material (Note 3)	
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Cooling Water Surge Tanks	PB	CS	Ventilation	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Cooling Water Heat Exchangers (channel heads)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Cooling Water Heat Exchangers (shells)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-15 Aging Management Review Results – Diesel Generator Cooling Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Cooling Water Heat Exchangers (tubes)	HT, PB	Cu	Raw Water	Fouling	Performance Test Activity – Diesel Engine Cooling Water Heat Exchanger
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Diesel Generator Engine Cooling Water
			Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
D/G Engine Cooling Water Heat Exchangers (tube sheets)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
D/G Engine Cooling Water Turbocharger Intercoolers (channel heads)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Cooling Water Turbocharger Intercoolers (shells)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-15 Aging Management Review Results – Diesel Generator Cooling Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Cooling Water Turbocharger Intercoolers (tubes)	HT, PB	Cu	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
D/G Engine Cooling Water Turbocharger Intercoolers (tube sheets)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
D/G Intercooler Pumps	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Jacket Water Circulating Pumps	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Jacket Water Heaters	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-15 Aging Management Review Results – Diesel Generator Cooling Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Jacket Water Pumps	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Flow Orifices	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Piping	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Loss of Material (Note 3)	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Piping	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-15 Aging Management Review Results – Diesel Generator Cooling Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-15 Aging Management Review Results – Diesel Generator Cooling Water System (McGuire Nuclear Station):

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CI Cast Iron
Cu Copper
SS Stainless Steel

(3) Component subject to alternate wetting and drying which may concentrate contaminants

Table 3.3-16 Aging Management Review Results – Diesel Generator Cooling Water System (Catawba Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Driven Jacket Water Circulation Pumps	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Jacket Water Coolers (channel heads)	PB	CS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Jacket Water Coolers (shells)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-16 Aging Management Review Results – Diesel Generator Cooling Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment** **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Jacket Water Coolers (tubes)	HT, PB	BR	Raw Water	Fouling	Performance Testing Activities – Diesel Generator Engine Cooling Water Heat Exchangers
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Diesel Generator Engine Cooling Water
			Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
D/G Engine Jacket Water Coolers (tube sheets)	PB	CS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
D/G Engine Jacket Water Keep Warm Pumps	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
D/G Engine Jacket Water Standpipes	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Loss of Material (Note 3)	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-16 Aging Management Review Results – Diesel Generator Cooling Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Jacket Water Standpipes	PB	CS	Ventilation	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Governor Lube Oil Coolers (end covers)	PB	AL	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
D/G Governor Lube Oil Coolers (shells)	PB	AL	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
D/G Governor Lube Oil Coolers (tubes)	HT, PB	BR	Treated Water	Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
Piping	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-16 Aging Management Review Results – Diesel Generator Cooling Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-16 Aging Management Review Results – Diesel Generator Cooling Water System (Catawba Nuclear Station):

(1)	**Component Function**
HT	Provide heat transfer so that system and/or component operating temperatures are maintained.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
(2)	**Material**
AL	Aluminum
BR	Brass
CI	Cast Iron
CS	Carbon Steel
SS	Stainless Steel
(3)	Component subject to alternate wetting and drying which may concentrate contaminants

Table 3.3-17 Aging Management Review Results – Diesel Generator Crankcase Vacuum System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Diesel Generator Crankcase Vacuum Blowers (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Diesel Generator Crankcase Vacuum Oil Separators (MNS Only)	FI	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Diesel Generator Crankcase Vacuum Oil Separators (MNS Only)	GR	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Diesel Generator Crankcase Vacuum Oil Separators (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-17 Aging Management Review Results – Diesel Generator Crankcase Vacuum System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Orifices (MNS Only)	PB, TH	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing (MNS Only)	PB	BR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing (MNS Only)	PB	Cu	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-17 Aging Management Review Results – Diesel Generator Crankcase Vacuum System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Valve Bodies (MNS Only)	PB	BR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies (CNS Only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-17 Aging Management Review Results – Diesel Generator Crankcase Vacuum System:

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
GR Provide gas removal so that sufficient vacuum is maintained, or to ensure sufficient fluid system level, priming, or inventory.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

BR Brass
Cu Copper
CS Carbon Steel
SS Stainless Steel

Table 3.3-18 Aging Management Review Results – Diesel Generator Fuel Oil System (McGuire Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Driven Fuel Oil Pump Casings	PB	CI	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Booster Pump Casings	PB	CI	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Day Tanks	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Day Tanks	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Duplex Filters	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Storage Tanks	PB	CS	Ventilation	None Identified	None Required
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection

Table 3.3-18 Aging Management Review Results – Diesel Generator Fuel Oil System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Fuel Oil Storage Tanks	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
D/G Fuel Oil Transfer Filters	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
D/G Fuel Oil Transfer Pump Casings	PB	CI	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Flame Arrestors	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Flow Meters	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-18 Aging Management Review Results – Diesel Generator Fuel Oil System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
Strainers	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection

Notes for Table 3.3-18 Aging Management Review Results – Diesel Generator Fuel Oil System (McGuire Nuclear Station):

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CI Cast Iron
CS Carbon Steel
SS Stainless Steel

Table 3.3-19 Aging Management Review Results – Diesel Generator Fuel Oil System (Catawba Nuclear Station)

(Note are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Driven Fuel Oil Pump Casings	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Driven Fuel Oil Pump Strainer Baskets	FI	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
D/G Engine Driven Fuel Oil Pump Strainer Bodies	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Fuel Oil Filters	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Motor Driven Fuel Oil Booster Pump Casings	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Motor Driven Fuel Oil Booster Pump Strainer Baskets	FI	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-19 Aging Management Review Results – Diesel Generator Fuel Oil System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Motor Driven Fuel Oil Booster Pump Strainer Bodies	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Day Tanks	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Day Tanks	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Fuel Oil Storage Tanks	PB	CS	Ventilation	None Identified	None Required
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
D/G Fuel Oil Storage Tanks	PB	CS	Oil	Loss of Material	Chemistry Control Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
Flexible Hoses	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-19 Aging Management Review Results – Diesel Generator Fuel Oil System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
Pipe	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required
Tubing	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-19 Aging Management Review Results – Diesel Generator Fuel Oil System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Valve Bodies	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coating Inspection
Valve Bodies	PB	SS	Oil	Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required

Notes for Table 3.3-19 Aging Management Review Results – Diesel Generator Fuel Oil System (Catawba Nuclear Station):

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.3-20 Aging Management Review Results – Diesel Generator Lube Oil System (McGuire Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Before & After Lube Oil Pump Casings	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Driven Lube Oil Pump Casings	PB	Cast Iron	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Lube Oil Coolers (tube sheets)	PB	Cu-Alloy	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
D/G Lube Oil Coolers (tubes)	PB, HT	BR	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
D/G Lube Oil Coolers (tubes)	PB, HT	Cu-Ni	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
D/G Lube Oil Coolers (shells)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-20 Aging Management Review Results – Diesel Generator Lube Oil System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Lube Oil Coolers (channel heads)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Lube Oil Engine Intake Strainers	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Lube Oil Filters	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
D/G Lube Oil Heaters	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Strainers	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-20 Aging Management Review Results – Diesel Generator Lube Oil System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-20 Aging Management Review Results – Diesel Generator Lube Oil System (McGuire Nuclear Station):

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
Cu-Alloy Muntz metal
Cu-Ni Copper Nickel Alloy
SS Stainless Steel

Table 3.3-21 Aging Management Review Results - Diesel Generator Lube Oil System (Catawba Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Driven Lube Oil Pump Casings	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Lube Oil Coolers (shell)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Lube Oil Coolers (tube sheet)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
D/G Engine Lube Oil Coolers (tube)	HT, PB	Copper Alloy	Treated Water	Loss of Material	Chemistry Control Program
			Oil	None Identified	None Required
D/G Engine Lube Oil Coolers (channel head)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Lube Oil Filters	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-21 Aging Management Review Results - Diesel Generator Lube Oil System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Lube Oil Strainers	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Prelube Oil Filters	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Prelube Oil Pump Casings	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Prelube Oil Strainers	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Lube Oil Sump Tank Filters	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Lube Oil Sump Tanks	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Flexible Hoses	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-21 Aging Management Review Results - Diesel Generator Lube Oil System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Lube Oil Pressure Regulating Valve Strainers	FI, PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Oil	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-21 Aging Management Review Results - Diesel Generator Lube Oil System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required

Notes form Table 3.3-21 Aging Management Review Results - Diesel Generator Lube Oil System (Catawba Nuclear Station):

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected
HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.3-22 Aging Management Review Results – Diesel Generator Room Sump Pump

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Sump Room Sump Pump Casings	PB	CI – MNS CS– CNS	Raw Water	Loss of Material	Selective Leaching Inspection (MNS Only) Galvanic Susceptibility Inspection Sump Pump System Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Orifices (MNS Only)	PB	SS	Raw Water	Loss of Material	Sump Pump Systems Inspection
			Sheltered	None Identified	None Required
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump Systems Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump Systems Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-22 Aging Management Review Results – Diesel Generator Room Sump Pump (continued)

1	2	3	4	5	6
Component Type	Component Function (Note1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump Systems Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Raw Water	Loss of Material	Sump Pump Systems Inspection
			Sheltered	None Identified	None Required

Notes for Table 3.3-22 Aging Management Review Results – Diesel Generator Room Sump Pump:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

BR Brass
CI Cast Iron
CS Carbon Steel
Cu Copper
SS Stainless Steel

(3) Component subject to alternate wetting and drying which may concentrate contaminants.

Table 3.3-23 Aging Management Review Results – Diesel Generator Starting Air System (McGuire Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Control Air Filter	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required
D/G Starting Air Line Filter	PB, FI	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required
D/G Starting Air Tank	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Expansion Joints	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-23 Aging Management Review Results – Diesel Generator Starting Air System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Valve Bodies	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-23 Aging Management Review Results – Diesel Generator Starting Air System (McGuire Nuclear Station):

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.3-24 Aging Management Review Results – Diesel Generator Starting Air System (Catawba Nuclear Station)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Afterfilters	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Starting Air Aftercoolers (tube sheets)	PB	Monel 400	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Air (moist)	None Identified	None Required
D/G Engine Starting Air Aftercoolers (tubes)	PB	SS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Diesel Generator Engine Starting Air
			Air (moist)	None Identified	None Required
D/G Engine Starting Air Aftercoolers (channel heads)	PB	CS	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Diesel Generator Engine Starting Air
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Starting Air Aftercoolers (shells)	PB	CS	Air (moist)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-24 Aging Management Review Results – Diesel Generator Starting Air System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
D/G Engine Starting Air Compressor Inlet Filters	PB	CS	Air (moist)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
D/G Engine Starting Air Tank	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Flow Meters	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Moisture Separators	PB	CS	Air (moist)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Orifices	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-24 Aging Management Review Results – Diesel Generator Starting Air System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Air (moist)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Prefilters	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Silencers	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Starting Air Distributor Filters	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-24 Aging Management Review Results – Diesel Generator Starting Air System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Air (moist)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-24 Aging Management Review Results – Diesel Generator Starting Air System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Air (dry)	None Identified	None Required
			Sheltered	None Identified	None Required
Y-Strainers	FI, PB	CS	Air (dry)	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-24 Aging Management Review Results – Diesel Generator Starting Air System (Catawba Nuclear Station):

(1)	**Component Function**
FI	Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2)	**Material**
CS	Carbon Steel
Monel 400	A copper nickel alloy
SS	Stainless Steel

Table 3.3-25 Aging Management Review Results – Drinking Water System

(Catawba Nuclear Station only)
(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Program s and Activities**
Pipe	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required

Notes for Table 3.3-25 Aging Management Review Results – Drinking Water System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

SS Stainless Steel

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System					
Cylinders (Halon)	PB	AS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Fire Hose Rack	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Fire Hose Rack	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Flexible Hose	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	GS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Pipe	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CU	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Pipe	PB	MI	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Pipe	PB	DI	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Pressure Switches	PB	BZ	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Rupture Discs	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Spray Nozzles	PB, SP	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Spray Nozzles	PB, SP	CS	Ventilation	None Identified	None Required
			Ventilation	None Identified	None Required
Spray Nozzles	PB, SP	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Spray Nozzles	PB, SP	SS	Ventilation	None Identified	None Required
			Ventilation	None Identified	None Required
Spray Nozzles	PB, SP	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Spray Nozzles	PB, SP	BZ	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Sprinklers	PB, SP	BR	Raw Water	Fouling	Fire Protection Program
				Loss of Material	Fire Protection Program Galvanic Susceptibility Inspection Selective Leaching Inspection
			Reactor Building	Loss of Material	Fluid Leak Management Program
Sprinklers	PB, SP	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Sprinklers	PB, SP	BZ	Raw Water	Fouling	Fire Protection Program
				Loss of Material	Fire Protection Program Galvanic Susceptibility Inspection
			Reactor Building	Loss of Material	Fluid Leak Management Program
Sprinklers	PB, SP	BZ	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Sprinklers	PB, SP	BR	Raw Water	Fouling (Note 4)	Fire Protection Program
				Loss of Material	Fire Protection Program Galvanic Susceptibility Inspection Selective Leaching Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Sprinklers	PB	BZ	Raw Water	Fouling	Fire Protection Program
				Loss of Material	Fire Protection Program Galvanic Susceptibility Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BZ	Raw Water	Loss of Material	Service Water Piping Corrosion Program Galvanic Susceptibility Program
				Fouling (Note 4)	Fire Protection Program
			Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	BZ	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Valve Bodies	PB	BZ	Raw Water	Loss of Material	Service Water Piping Corrosion Program Galvanic Susceptibility Program
				Fouling (Note 4)	Fire Protection Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BZ	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

<table>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr>
<tr><th rowspan="2">Component Type</th><th rowspan="2">Component Function (Note 1)</th><th rowspan="2">Material (Note 2)</th><th>Internal Environment</th><th rowspan="2">Aging Effects</th><th rowspan="2">Aging Management Programs and Activities</th></tr>
<tr><th>External Environment</th></tr>
<tr><td colspan="6">Interior Fire Protection System (continued)</td></tr>
<tr><td rowspan="2">Valve Bodies</td><td rowspan="2">PB</td><td rowspan="2">CS</td><td>Raw Water</td><td>Loss of Material</td><td>Galvanic Susceptibility Inspection
Service Water Piping Corrosion Program</td></tr>
<tr><td>Reactor Building</td><td>Loss of Material</td><td>Fluid Leak Management Program
Inspection Program for Civil Engineering Structures and Components</td></tr>
<tr><td rowspan="2">Valve Bodies</td><td rowspan="2">PB</td><td rowspan="2">CS</td><td>Ventilation</td><td>None Identified</td><td>None Required</td></tr>
<tr><td>Reactor Building</td><td>Loss of Material</td><td>Fluid Leak Management Program (Note 3)
Inspection Program for Civil Engineering Structures and Components</td></tr>
<tr><td rowspan="2">Valve Bodies</td><td rowspan="2">PB</td><td rowspan="2">CS</td><td>Raw Water</td><td>Loss of Material</td><td>Galvanic Susceptibility Inspection
Service Water Piping Corrosion Program</td></tr>
<tr><td>Sheltered</td><td>Loss of Material</td><td>Fluid Leak Management Program (Note 3)
Inspection Program for Civil Engineering Structures and Components</td></tr>
</table>

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	BR	Raw Water	Loss of Material	Selective Leaching Inspection Service Water Piping Corrosion Program Galvanic Susceptibility Inspection
				Fouling (Note 4)	Fire Protection Program
			Reactor Building	Loss Of Material	Fluid Leak Management Program
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Interior Fire Protection System (continued)					
Valve Bodies	PB	BR	Raw Water	Loss of Material	Service Water Piping Corrosion Program Galvanic Susceptibility Inspection Selective Leaching Inspection
				Fouling (Note 4)	Fire Protection Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BR	Gas	None Identified	None Required
			Sheltered (Turbine Building)	None Identified	None Required

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Exterior Fire Protection System					
Orifices	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Pipe	PB	GS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Pipe	PB	GS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Embedded	None Identified	None Required
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Pipe	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Embedded	None Identified	None Required

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pulsation Dampeners	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Pump Casings (Bowls)	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
Standpipes	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Standpipes	PB	CI	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Exterior Fire Protection System (continued)					
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	BR	Raw Water	Loss of Material	Service Water Piping Corrosion Inspection Galvanic Susceptibility Inspection Selective Leaching Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BR	Raw Water	Loss of Material	Service Water Piping Corrosion Inspection Galvanic Susceptibility Inspection Selective Leaching Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Valve Bodies	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Valve Bodies	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
				Fouling (Note 4)	Fire Protection Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CI	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Valve Bodies	PB	BZ	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BZ	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BZ	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	BZ	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-26 Aging Management Review Results – Fire Protection System (McGuire Nuclear Station):

(1)	**Component Function**
FI	Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
SP	Provide spray flow so that sufficient spray flow and/or flow patterns are maintained.
(2)	**Material**
AS	Alloy Steel
BR	Brass
BZ	Bronze
CI	Cast Iron
CS	Carbon Steel
DI	Ductile Iron
GS	Galvanized Steel
MI	Malleable Iron
SS	Stainless Steel
(3)	The Fluid Leak Management Program is applicable for components only within the Reactor Building or Auxiliary Building.
(4)	Fire Hose Rack Valves Only

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System					
Cylinders (CO_2)	PB	AS (Cr-Mo)	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Flexible Hose	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Fire Hose Rack	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Fire Hose Rack	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Orifices	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Pipe	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Pipe	PB	MI	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Pipe	PB	CS	Ventilation	None Identified	None Required
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Air-Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Pipe	PB	SS	Ventilation	None Identified	None Required
			Yard	None Identified	None Required
Pipe	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Spray Nozzle	PB, SP	SS	Ventilation	None Identified	None Required
			Ventilation	None Identified	None Required
Spray Nozzle	PB, SP	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Spray Nozzle	PB, SP	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Sprinkler	PB, SP	BR	Raw Water	Fouling	Fire Protection Program
				Loss of Material	Fire Protection Program Galvanic Susceptibility Inspection Selective Leaching Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Sprinkler	PB, SP	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Tanks (CO_2)	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	BR	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Valve Bodies	PB	BR	Raw Water	Fouling (Note 4)	Fire Protection Program
				Loss of Material	Galvanic Susceptibility Program Service Water Piping Corrosion Program Selective Leaching Inspection
			Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	BR	Raw Water	Fouling (Note 4)	Fire Protection Program
				Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3)
Valve Bodies	PB	BZ	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	BZ	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	BZ	Raw Water	Fouling (Note 4)	Fire Protection Program
				Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Interior Fire Protection System (continued)					
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System					
Orifices	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Orifices	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Yard	None Identified	None Required
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Pipe	PB	DI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Yard	None Identified	None Required
Pipe	PB	GS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pump Casing (Main Fire Pumps)	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Yard	None Identified	None Required

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Valve Bodies	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CI	Raw Water	Fouling (Note 4)	Fire Protection Program
				Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program Selective Leaching Inspection
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection

Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Exterior Fire Protection System (continued)					
Valve Bodies	PB	CI	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	PVDF	Raw Water	None Identified	None Required
			Yard	None Identified	None Required

Notes for Table 3.3-27 Aging Management Review Results – Fire Protection System (Catawba Nuclear Station):

(1)	**Component Function**
FI	Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
SP	Provide spray flow so that sufficient spray flow and/or flow patterns are maintained.
(2)	**Material**
Cr-Mo	Chromium Molybdenum
AS	Alloy Steel
BR	Brass
BZ	Bronze
CI	Cast Iron
CS	Carbon Steel
DI	Ductile Iron
GS	Galvanized Steel
MI	Malleable Iron
PVDF	Polyvinyldifluoride
SS	Stainless Steel
(3)	The Fluid Leak Management Program is applicable for components only within the Reactor Building or Auxiliary Building.

Table 3.3-28 Aging Management Review Results – Fuel Handling Building Ventilation System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Air Flow Monitors	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Filter	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	Cu	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-28 Aging Management Review Results – Fuel Handling Building Ventilation System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2)	**Material**
BR	Brass
CS	Carbon Steel
Cu	Copper
GS	Galvanized Steel
SS	Stainless Steel

Table 3.3-29 Aging Management Review Results – Groundwater Drainage System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pump Casings	PB	CI-MNS CS-CNS	Raw Water	Loss of Material	Selective Leaching Inspection (McGuire) Galvanic Susceptibility Inspection Sump Pump System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pump Casings	PB	CI-MNS CS-CNS	Raw Water	Loss of Material	Selective Leaching Inspection (McGuire) Galvanic Susceptibility Inspection Sump Pump System Inspection
			Raw Water	Loss of Material	Selective Leaching Inspection (McGuire) Galvanic Susceptibility Inspection Sump Pump System Inspection
Orifices (CNS Only)	PB	SS	Raw Water	Loss of Material	Sump Pump System Inspection
			Sheltered	None Identified	None Required
Pipe (CNS Only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump System Inspection
			Embedded in Concrete	None Identified	None Required

Table 3.3-29 Aging Management Review Results – Groundwater Drainage System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	SS	Raw Water	Loss of Material	Sump Pump System Inspection
			Sheltered	None Identified	None Required
Pipe (MNS Only)	PB	SS	Raw Water	Loss of Material	Sump Pump System Inspection
			Yard	None Identified	None Required
Tubing	PB	SS	Raw Water	Loss of Material	Sump Pump System Inspection
			Sheltered	None Identified	None Required
Valve Bodies (MNS Only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Sump Pump System Inspection
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Raw Water	Loss of Material	Sump Pump System Inspection
			Sheltered	None Identified	None Required

Notes for Table 3.3-29 Aging Management Review Results – Groundwater Drainage System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CI Cast Iron
CS Carbon Steel
SS Stainless Steel

Table 3.3-30 Aging Management Review Results – Hydrogen Bulk Storage System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe (MNS Only)	PB	SS	Gas	None Identified	None Required
			Yard	None Identified	None Required
Tubing (CNS Only)	PB	Cu	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies (CNS Only)	PB	BR	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-30 Aging Management Review Results – Hydrogen Bulk Storage System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CS Carbon Steel
Cu Copper
SS Stainless Steel

Table 3.3-31 Aging Management Review Results – Instrument Air System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Filters (Housings only) (MNS only)	PB	SS	Air	None Identified	None Required
			Sheltered	None Identified	None Required
FIV Assured VI Supply Accumulators (MNS only)	PB	SS	Air	None Identified	None Required
			Sheltered	None Identified	None Required
Instrument Air Tanks (Blackout) (MNS only)	PB	CS	Air	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Air	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Air	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe (MNS only)	PB	GS	Air	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program

Table 3.3-31 Aging Management Review Results – Instrument Air System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Tubing	PB	SS	Air	None Identified	None Required
			Reactor Building	None Identified	None Required
Tubing (MNS only)	PB	SS	Air	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing (MNS only)	PB	BR	Air	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing (MNS only)	PB	Cu	Air	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	SS	Air	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Air	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies (MNS only)	PB	CS	Air	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (MNS only)	PB	BR	Air	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program

Notes for Table 3.3-31 Aging Management Review Results – Instrument Air System:

(1)	Component Function
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2)	Material
BR	Brass
CS	Carbon Steel
Cu	Copper
GS	Galvanized Steel
SS	Stainless Steel

Table 3.3-32 Aging Management Review Results – Liquid Waste System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Motor Driven Auxiliary Feedwater Pump Sump Pumps (CNS only)	PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Residual Heat Removal Pump and Containment Spray Pump Room Sump Pumps (CNS only)	PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Orifices (CNS only)	PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Pipe	PB	CS	Gas	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-32 Aging Management Review Results – Liquid Waste System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe (CNS only)	PB	CS	Raw Water	Loss of Material	Liquid Waste System Inspection Galvanic Susceptibility Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (Note 3)
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Borated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Pipe (CNS only)	PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required

Table 3.3-32 Aging Management Review Results – Liquid Waste System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe (CNS only)	PB	SS	Treated Water	Cracking	Chemistry Control Program (Auxiliary Steam Supply to Feed Preheater Only)
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe (CNS only)	PB	SS	Treated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Pipe (MNS only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Loss of Material (Wet/Dry)	Chemistry Control Program
				Cracking (Wet/Dry)	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe (MNS only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe (MNS only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required

Table 3.3-32 Aging Management Review Results – Liquid Waste System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Pipe (MNS only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Separators (CNS only)	FI, PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Strainers (CNS only)	FI, PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Turbine Driven Auxiliary Feedwater Pump Sump Pumps (CNS only)	PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Tubing (CNS only)	PB	SS	Borated Water	Loss of Material	Liquid Waste System Inspection
				Cracking	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-32 Aging Management Review Results – Liquid Waste System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies (CNS only)	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Liquid Waste System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (Note 3)
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Borated Water	Loss of Material	Liquid Waste System Inspection
				Cracking	Liquid Waste System Inspection
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Loss of Material	Liquid Waste System Inspection
				Cracking	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies (CNS only)	PB	SS	Raw Water	Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required

Table 3.3-32 Aging Management Review Results – Liquid Waste System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies (CNS only)	PB	SS	Treated Water	Cracking	Liquid Waste System Inspection
				Loss of Material	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Valve Bodies (Ventilation Unit Drains)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies (Ventilation Unit Drains)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies (Loop Seals – MNS only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Cracking (wet/dry)	Chemistry Control Program
				Loss of Material (wet/dry)	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-32 Aging Management Review Results – Liquid Waste System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Waste Drain Tank (CNS only)	PB	SS	Borated Water	Loss of Material	Liquid Waste System Inspection
				Cracking	Liquid Waste System Inspection
			Sheltered	None Identified	None Required
Waste Drain Tank (CNS only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-32 Aging Management Review Results – Liquid Waste System:

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CS Carbon Steel
Cu Copper
SS Stainless Steel

(3) The Flow Accelerated Corrosion Program applies only to the components in the steam supply line from the Auxiliary Steam System to the Evaporator Package

Table 3.3-33 Aging Management Review Results – Miscellaneous Structures Ventilation System

(Catawba Nuclear Station Only)
(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Air Handling Unit	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Flexible Connectors	PB	Neoprene (Note 3)	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Plenum Section	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-33 Aging Management Review Results – Miscellaneous Structures Ventilation System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

GS Galvanized Steel

(3) Woven glass fabric double-coated neoprene.

Table 3.3-34 Aging Management Review Results – Nitrogen System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	Component Function **(Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Nitrogen Supply Tanks (MNS Only)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing (MNS Only)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valves Bodies	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-34 Aging Management Review Results – Nitrogen System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

SS Stainless Steel

Table 3.3-35 Aging Management Review Results – Nuclear Sampling System

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Orifice	PB, TH	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required

Table 3.3-35 Aging Management Review Results – Nuclear Sampling System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-35 Aging Management Review Results – Nuclear Sampling System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-35 Aging Management Review Results – Nuclear Sampling System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

SS Stainless Steel

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Centrifugal Charging Pump Bearing Oil Coolers (tubes)	HT, PB	Cu-Ni	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities-Pump Oil Coolers
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
			Oil	None Identified	None Required
Centrifugal Charging Pump Bearing Oil Coolers (tube sheets)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Oil	None Identified	None Required
Centrifugal Charging Pump Bearing Oil Coolers (shells)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Centrifugal Charging Pump Bearing Oil Coolers (channel covers)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Centrifugal Charging Pump Speed Reducer Oil Coolers (tubes)	HT, PB	Cu-Ni	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities-Pump Oil Coolers
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
			Oil	None Identified	None Required
Centrifugal Charging Pump Speed Reducer Oil Coolers (tube sheets)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Oil	None Identified	None Required
Centrifugal Charging Pump Speed Reducer Oil Coolers (shells)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Centrifugal Charging Pump Speed Reducer Oil Coolers (channel covers)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Expansion Joints	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Nuclear Service Water Pump Casings	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Nuclear Service Water Strainers	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Orifices	PB, TH	SS	Raw Water	Loss of Material (Note 3)	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Pipe	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Bearing Oil Coolers (tubes)	PB	Cu-Ni	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
			Oil	None Identified	None Required
Reciprocating Charging Pump Bearing Oil Coolers (tube sheets)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Oil	None Identified	None Required
Reciprocating Charging Pump Bearing Oil Coolers (channel covers)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Reciprocating Charging Pump Fluid Drive Oil Coolers (tubes)	PB	Cu-Ni	Raw Water	Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
			Oil	None Identified	None Required
Reciprocating Charging Pump Fluid Drive Oil Coolers (tube sheets)	PB	BR	Raw Water	Loss of Material	Selective Leaching Inspection Service Water Piping Corrosion Program
			Oil	None Identified	None Required

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Reciprocating Charging Pump Fluid Drive Oil Coolers (channel covers)	PB	CI	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Safety Injection Pump Bearing Oil Coolers (tubes)	HT, PB	Cu-Ni	Raw Water	Fouling	Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
				Loss of Material	Heat Exchanger Preventive Maintenance Activities – Pump Oil Coolers
			Oil	None Identified	None Required
Safety Injection Pump Bearing Oil Coolers (tube sheets)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Oil	None Identified	None Required
Safety Injection Pump Bearing Oil Coolers (shells)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Safety Injection Pump Bearing Oil Coolers (channel covers)	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection

Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required

Notes for Table 3.3-36 Aging Management Review Results – Nuclear Service Water System (McGuire Nuclear Station):

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

BR Brass
CI Cast Iron
CS Carbon Steel
Cu-Ni Copper-Nickel Alloy
SS Stainless Steel

(3) Loss of material due to corrosion will not affect the throttling function of orifices.

Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Annubars	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Annubars	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Underground	Cracking	Preventive Maintenance Activities-Condenser Circulating Water System Internal Coating Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Flexible Hoses	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered (Note 3)	None Identified	None Required
Manways	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Nuclear Service Water Pump Casings	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered (Note 3)	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Orifices	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Orifices	PB, TH	SS	Raw Water	Loss of Material (Note 4)	Service Water Piping Corrosion Program
			Sheltered (Note 3)	None Identified	None Required

Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered (Auxiliary Building)	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered (Note 3)	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulation Water System Internal Coating Inspection
Pipe	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Strainers	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered (Note 3)	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Strainers	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered (Auxiliary Building)	None Identified	None Required

Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Tubing	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Yard	None Identified	None Required
Tubing	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered (Note 3)	None Identified	None Required
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered (Auxiliary Building)	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Sheltered (Note 3)	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Raw Water	Loss of Material	Galvanic Susceptibility Inspection Service Water Piping Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Raw Water	Loss of Material	Service Water Piping Corrosion Program
			Yard	None Identified	None Required

Notes for Table 3.3-37 Aging Management Review Results – Nuclear Service Water System (Catawba Nuclear Station):

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.
(2)	**Material**
CS	Carbon Steel
SS	Stainless Steel
(3)	Sheltered environment to include the Diesel Building and/or the Pumphouse, but not the Auxiliary Building. Only in the sheltered environment of the Auxiliary Building is leakage from borated water systems possible.
(4)	Loss of material due to corrosion will not affect the throttling function of orifices.

Table 3.3-38 Aging Management Review Results – Nuclear Service Water Pump Structure Ventilation System (Catawba Nuclear Station only)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	BR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	Cu	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	BR	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-38 Aging Management Review Results – Nuclear Service Water Pump Structure Ventilation System (Catawba Nuclear Station only) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-38 Aging Management Review Results – Nuclear Service Water Pump Structure Ventilation System (Catawba Nuclear Station only):

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CS Carbon Steel
Cu Copper
GS Galvanized Steel
SS Stainless Steel

Table 3.3-39 Aging Management Review Results – Nuclear Solid Waste Disposal System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment (Note 3)** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Pipe (MNS Only)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe (MNS Only) (Note 5)	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection

Table 3.3-39 Aging Management Review Results – Nuclear Solid Waste Disposal System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment (Note 3) / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe (MNS Only) (Note 5)	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Gas	None Identified	None Required
Screens (MNS Only)	FI	SS	(Note 4)	None Identified	None Required
			Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
Spent Resin Storage Tanks (MNS Only)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Spent Resin Storage Tanks (MNS Only)	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Tubing (MNS Only)	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required

Table 3.3-39 Aging Management Review Results – Nuclear Solid Waste Disposal System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment (Note 3)** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Treated Water	Cracking	Treated Water Systems Stainless Steel Inspection
				Loss of Material	Treated Water Systems Stainless Steel Inspection
			Sheltered	None Identified	None Required
Valve Bodies (MNS Only)	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-39 Aging Management Review Results – Nuclear Solid Waste Disposal System:

(1) **Component Function**

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) **Material**

SS Stainless Steel

(3) The Treated Water environment of the Nuclear Solid Waste Disposal System contains spent fuel resin in solution.

(4) The Spent Fuel Resin Tank screens have no internal environment

(5) Pipe extending into the Spent Resin Storage Tank

Table 3.3-40 Aging Management Review Results – Reactor Coolant Pump Motor Oil Collection Sub-System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Flexible Hoses	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Level Gauges	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Level Gauges	PB	Glass	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Reactor Coolant Pump Motor Drain Tanks	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Reactor Coolant Pump Motor Drain Tank Pump Casings	PB	CI – MNS CS – CNS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-40 Aging Management Review Results – Reactor Coolant Pump Motor Oil Collection Sub-System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Coolant Pump Motor Lower Oil Catcher	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Reactor Coolant Pump Motor Lower Oil Pot (MNS Only)	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Reactor Coolant Pump Motor Oil Lift Enclosure	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Reactor Coolant Pump Motor Upper Oil Cooler Enclosures	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-40 Aging Management Review Results – Reactor Coolant Pump Motor Oil Collection Sub-System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Reactor Coolant Pump Motor Upper Oil Cooler Enclosures (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-40 Aging Management Review Results – Reactor Coolant Pump Motor Oil Collection Sub-System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies (MNS Only)	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-40 Aging Management Review Results – Reactor Coolant Pump Motor Oil Collection Sub-System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
(2)	**Material**
CI	Cast Iron
CS	Carbon Steel
SS	Stainless Steel

Table 3.3-41 Aging Management Review Results – Reactor Coolant System (Non-Class 1 Components)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Orifices	PB, TH	SS	Gas (Note 3)	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing (CNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-41 Aging Management Review Results – Reactor Coolant System (Non-Class 1 Components) (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Gas	None Identified	None Required
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Gas	None Identified	None Required
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-41 Aging Management Review Results – Reactor Coolant System (Non-Class 1 Components):

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.
(2)	**Material**
CS	Carbon Steel
SS	Stainless Steel
(3)	The orifice will normally pass non-condensable gas, but may also pass borated water or steam, or any mixture of the three.

Table 3.3-42 Aging Management Review Results – Recirculated Cooling Water System

(Catawba Nuclear Station Only)
(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Pipe	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-42 Aging Management Review Results – Recirculated Cooling Water System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel

Table 3.3-43 Aging Management Review Results – Spent Fuel Cooling System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchangers (channel head)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
		CS	Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchangers (shell)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Heat Exchangers (tube sheet) (CNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
		CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Heat Exchangers (tube sheet) (MNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Table 3.3-43 Aging Management Review Results – Spent Fuel Cooling System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Heat Exchangers (tube)	PB, HT	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Chemistry Control Program
				Fouling	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Orifices	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe (CNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
Pump Casings	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-43 Aging Management Review Results – Spent Fuel Cooling System (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effect	Aging Management Programs and Activities
Spacers (MNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies (CNS Only)	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Borated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program

Notes for Table 3.3-43 Aging Management Review Results – Spent Fuel Cooling System:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.3-44 Aging Management Review Results – Standstill Shutdown Diesel

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Cooling Water and Jacket Water Heating Sub-system					
Filter, Cooling Water (mounting head)	PB	CS	Treated Water	Cracking (Note 3)	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, Engine Radiator (tubes)	PB, HT	Cu	Treated Water	Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Heat Exchanger, Engine Radiator (channel head)	PB	CS	Treated Water	Cracking (Note 3)	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Heat Exchanger, Engine Radiator (leakoff connector)	PB	Cu	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Cooling Water and Jacket Water Heating Sub-system (continued)					
Heat Exchanger, Engine Radiator (cap flange)	PB	CS	Treated Water	Cracking (Note 3)	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	CS	Treated Water	Cracking (Note 3)	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies, Jacket Water Heating	PB	BR	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Water Heater, Jacket (shell)	PB	CI	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Exhaust Sub-system					
Bellows, Exhaust	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe, Exhaust	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe, Exhaust	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Silencer, Exhaust	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Fuel Oil Sub-system					
Filter, Duplex (mounting head)	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Flame Arrestor (MNS Only)	PB	AL	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Fuel Oil Sub-system (continued)					
Level Glass	PB	GL-CNS	Fuel Oil	None Identified	None Required
		AC-MNS	Sheltered	None Identified	None Required
Level Glass	PB	GL-CNS	Ventilation	None Identified	None Required
		AC-MNS	Sheltered	None Identified	None Required
Pipe, Fuel Oil	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe, Fuel Oil	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
Pipe, Fuel Oil	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required
Pipe, Fuel Oil Day Tank Vent	PB	SS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe, Fuel Oil Day Tank Vent	PB	SS	Ventilation	None Identified	None Required
			Yard	None Identified	None Required

Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Fuel Oil Sub-system (continued)					
Pipe, Fuel Oil Day Tank Drain (MNS Only)	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe, Fuel Oil Storage Tank Vent	PB	CS	Ventilation	None Identified	None Required
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe, Fuel Oil Storage Tank Vent	PB	CS	Ventilation	None Identified	None Required
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
Pipe, Fuel Oil Storage Tank Suction	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Fuel Oil	Loss of Material	Chemistry Control Program
Pipe, Fuel Oil Storage Tank Suction	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Ventilation	None Identified	None Required
Pump Casing, Fuel Oil Transfer	PB	BZ	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pump Casing, Engine Fuel Oil	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Fuel Oil Sub-system (continued)					
Tank, Fuel Oil Storage	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
Tank, Fuel Oil Storage	PB	CS	Ventilation	None Identified	None Required
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
Tank, Fuel Oil Storage (manway) (MNS only)	PB	CS	Ventilation	None Identified	None Required
			Underground	Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
Tank, Fuel Oil Day	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tank, Fuel Oil Day	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing, Fuel Oil (day tank)	PB	WI	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.3-44 Aging Management Review Results – Standboy Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Fuel Oil Sub-system (continued)					
Tank, Fuel Oil Storage (manway (CNS only)	PB	CS	Ventilation	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing, Fuel Oil	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies, Fuel Oil	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies, Fuel Oil	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required
Valve Bodies, Fuel Oil	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Fuel Oil	Loss of Material	Chemistry Control Program
Valve Bodies, Fuel Oil (MNS Only)	PB	SS	Fuel Oil	Loss of Material	Chemistry Control Program
			Underground	Cracking	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection
				Loss of Material	Preventive Maintenance Activities – Condenser Circulating Water System Internal Coatings Inspection

Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Fuel Oil Sub-system (continued)					
Valve Bodies, Fuel Oil (MNS Only)	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies, Fuel Oil (duplex filters) (CNS Only)	PB	CS	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies, Fuel Oil	PB	BZ	Fuel Oil	Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Lubrication Oil Sub-system					
Filter, Lube Oil Bypass (housing)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Filter, Lube Oil (mounting head)	PB	CS	Oil	None Identified	None Required
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-44 Aging Management Review Results – Standby Shutdown Diesel:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.
PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

AC Acrylic
AL Aluminum
BR Brass
BZ Bronze
CI Cast Iron
CS Carbon Steel
Cu Copper
GL Glass
SS Stainless Steel
WI Wrought Iron

(3) Cracking of carbon steel is only applicable to McGuire carbon steel components due to the use of nitrate corrosion inhibitors.

Table 3.3-45 Aging Management Review Results – Turbine Building Sump Pump System (Catawba Nuclear Station only)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Raw Water	Loss of Material	Sump Pump Systems Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-45 Aging Management Review Results – Turbine Building Sump Pump System (Catawba Nuclear Station only):

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel

Table 3.3-46 Aging Management Review Results – Turbine Building Ventilation System (McGuire Nuclear Station only)

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Air Handling Unit	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Ductwork	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Flexible Connectors	PB	Neoprene (Note 3)	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required
Plenum Section	PB	GS	Ventilation	None Identified	None Required
			Sheltered	None Identified	None Required

Notes for Table 3.3-46 Aging Management Review Results – Turbine Building Ventilation System (McGuire Nuclear Station only):

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

GS Galvanized Steel

(3) Woven glass fabric double coated with neoprene.

Table 3.3-47 Aging Management Review Results – Waste Gas System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Flow Meters	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Hydrogen Recombiners	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Hydrogen Recombiner Heat Exchangers (Shell)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Hydrogen Recombiner Heat Exchangers (Tubes)	HT, PB	SS	Gas	None Identified	None Required
			Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
				Fouling	Chemistry Control Program
Hydrogen Recombiner Heaters	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Hydrogen Recombiner Phase Separators	PB, WR	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.3-47 Aging Management Review Results – Waste Gas System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Hydrogen Recombiner Phase Separators	PB, WR	SS	Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
			Sheltered	None Identified	None Required
Hydrogen Recombiner Safety Disc	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Orifices (Compressor Seal – CNS only)	PB	SS	Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
			Sheltered	None Identified	None Required
Orifices (Compressor Make-up – CNS only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices (MNS only)	PB,TH	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Pipe	PB	CS	Gas	Loss of Material	Galvanic Susceptibility Inspection Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-47 Aging Management Review Results – Waste Gas System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
			Sheltered	None Identified	None Required
Pipe	PB	CS	Treated Water	Loss of Material	Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Strainers (CNS Only)	PB	SS	Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
			Sheltered	None Identified	None Required
Tubing	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies (CNS Only)	PB	BR	Treated Water	Loss of Material	Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	SS	Gas	None Identified	None Required
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Gas	Loss of Material	Galvanic Susceptibility Inspection Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-47 Aging Management Review Results – Waste Gas System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	SS	Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Loss of Material	Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Waste Gas Compressor Heat Exchangers (Tubes) (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
Waste Gas Compressor Heat Exchangers (Tube Sheet) (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Treated Water	Cracking	Waste Gas System Inspection
				Loss of Material	Waste Gas System Inspection
Waste Gas Compressor Heat Exchangers (Channel Heads) (CNS Only)	PB	CS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.3-47 Aging Management Review Results – Waste Gas System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Waste Gas Compressor Heat Exchanger (Shell) (CNS only)	PB	CS	Treated Water	Loss of Material	Galvanic Susceptibility Inspection Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Waste Gas Decay Tanks	PB	CS	Gas	Loss of Material	Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Waste Gas Decay Tanks	PB	CS	Treated Water	Loss of Material	Waste Gas System Inspection
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.3-47 Aging Management Review Results – Waste Gas System:

(1) Component Function

HT	Provide heat transfer so that system and/or component operating temperatures are maintained.
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
WR	Provide water removal so that sufficient moisture levels are maintained

(2) Material

BR	Brass
CS	Carbon Steel
SS	Stainless Steel

This is the last page of Section 3.3.

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEMS

Note: The aging management reviews for all steam and power conversion systems are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The following mechanical systems are evaluated in the indicated tables in Section 3.4, Steam and Power Conversion Systems:

- Auxiliary Feedwater System (Table 3.4-1)
- Auxiliary Steam System (Table 3.4-2)
- Condensate System (Table 3.4-3)
- Condensate Storage System (Table 3.4-4)
- Feedwater System (Table 3.4-5)
- Feedwater Pump Turbine Exhaust System (Table 3.4-6)
- Main Steam System (Table 3.4-7)
- Main Steam Supply to Auxiliary Equipment System (Table 3.4-8)
- Main Steam Vent to Atmosphere System (Table 3.4-9)
- Turbine Exhaust System (Table 3.4-6)

3.4.1 AGING MANAGEMENT REVIEW RESULTS TABLES

The results of the aging management review for each system of this section are provided in a table, as indicated above. Information contained in each table was obtained in the following manner:

Column 1 – The component types listed in Column 1 were identified through the screening methodology described in Section 2.1.2 of this application and are on the marked plant drawings identified in Section 2.3.4 of this application.

Column 2 – The component functions listed in Column 2 were obtained from plant specific engineering documents using the screening methodology described in Section 2.1.2.

Column 3 – The materials listed in Column 3 were obtained from the drawings identified in Section 2.3.4 of this application and other plant specific engineering documents.

Column 4 – The internal and external environments listed in Column 4 were obtained from plant specific engineering documents. External environments are also noted on the drawings identified in Section 2.3.4 of this application. These environments are as follows:

- **Treated water –** Treated water is demineralized water that may be deareated, treated with a biocide or corrosion inhibitors, or a combination of these treatments. Treated water does not include borated water, which is evaluated separately.

- **Sheltered environment –** The ambient conditions within the sheltered environment may or may not be controlled. The sheltered environment atmosphere is a moist air environment. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

- **Reactor Building –** The Reactor Building environment is moist air. Components in systems with external surface temperatures the same or higher than ambient conditions due to normal system operation are expected to be dry.

- **Oil and Fuel Oil –** Lubricating oil is an organic fluid used to reduce friction between moving parts. Fuel oil is the fuel used for the emergency diesel generators.

Column 5 – The aging effects listed in Column 5 were obtained using the following aging effects identification process. The aging effects that require management during the period of extended operation have been determined by reviewing the plant-specific materials of construction (Column 3) and operating environments (Column 4) for each structure and component (Column 1) that is subject to an aging management review.

To provide reasonable assurance that the aging effects that require management for a specific material-environment combination are the only aging effects of concern for McGuire and Catawba, Duke also performed a review of industry experience and NRC generic communications relative to these structures and components. Finally, relevant McGuire and Catawba operating experience have been reviewed to provide further confidence that the set of aging effects for the specific material-environment combinations have been identified. Taken together, the steps of this methodology provide reasonable assurance that the aging effects that require management during the period of extended operation for McGuire and Catawba structures and components have been identified.

This aging effects identification process is consistent with that process used in Section 3.5 of the Oconee Nuclear Station license renewal application. Furthermore, in Section 3.1 of NUREG-1723 the staff concluded that based on its review of the information provided in Sections 3.5.1 and 3.5.2 of the Oconee application, "the applicant has identified the aging effects that are associated with mechanical systems components reviewed in [Section 3.5]." This aging effects identification process provides reasonable assurance that the aging effects that require management during the period of extended operation have been identified.

Column 6 – The aging management programs and activities listed in Column 6 are credited to manage the effects of aging for the period of extended operation.

3.4.2 AGING MANAGEMENT PROGRAMS

The following aging management programs and activities are credited to manage the effects of aging for the steam and power conversion systems listed in Section 3.4:

- Chemistry Control Program *
- Flow Accelerated Corrosion Program *
- Fluid Leak Management Program *
- Inspection Program for Civil Engineering Structures and Components *
- Flow Accelerated Corrosion Program *

* This aging management program/activity is equivalent or similar to the corresponding program/activity that has been previously reviewed and found acceptable by the NRC staff during the Oconee License Renewal review, as documented in NUREG-1723.

Based on the evaluations provided in Appendix B for the aging management programs and activities listed above, the aging effects will be adequately managed such that the intended functions of the components listed in Tables 3.4-1 through 3.4-9 will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.4-1 Aging Management Review Results – Auxiliary Feedwater System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Eductors (CNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Motor-Driven CA Pump Casings	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifices	PB, TH	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (CNS Only)
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.4-1 Aging Management Review Results – Auxiliary Feedwater System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (CNS Only)
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required
Turbine-Driven CA Pump Casings	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.4-1 Aging Management Review Results – Auxiliary Feedwater System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
TDCAP Bearing Oil Cooler (Tubes)	PB, HT	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
				Fouling	Chemistry Control Program
			Oil	None Identified	None Required
TDCAP Bearing Oil Cooler (Tube Sheet)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Oil	None Identified	None Required
TDCAP Bearing Oil Cooler (Channel Heads)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
TDCAP Bearing Oil Cooler (Shell)	PB	SS	Oil	None Identified	None Required
			Sheltered	None Identified	None Required

Table 3.4-1 Aging Management Review Results – Auxiliary Feedwater System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (CNS Only)
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.4-1 Aging Management Review Results – Auxiliary Feedwater System:

(1) Component Function

HT Provide heat transfer so that system and/or component operating temperatures are maintained.

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.4-2 Aging Management Review Results – Auxiliary Steam System

(Note are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Program**
Pipe	PB	CS	Treated Water / Steam	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	CS	Treated Water / Steam	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Yard (Trench)	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing (CNS Only)	PB	CU	Treated Water / Steam	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing (CNS Only)	PB	BR	Treated Water / Steam	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
					Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Tubing (MNS Only)	PB	SS	Treated Water / Steam	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.4-2 Aging Management Review Results – Auxiliary Steam System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Program**
Valve Bodies (CNS Only)	PB	BR	Treated Water / Steam	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program
Valve Bodies	PB	CS	Treated Water / Steam	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water / Steam	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.4-2 Aging Management Review Results – Auxiliary Steam System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

BR Brass
CS Carbon Steel
CU Copper
SS Stainless Steel

Table 3.4-3 Aging Management Review Results – Condensate System

(Notes are located at the end of this table)
(Catawba Nuclear Station only)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.4-3 Aging Management Review Results – Condensate System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel

Table 3.4-4 Aging Management Review Results – Condensate Storage System

(Notes are located at the end of this table)
(Catawba Nuclear Station only)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.4-4 Aging Management Review Results – Condensate Storage System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

CS Carbon Steel

Table 3.4-5 Aging Management Review Results – Feedwater System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Cavitating Venturies (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			(Note 3)	None Identified	None Required
Cavitating Venturies (CNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			(Note 3)	None Identified	None Required
Flow Nozzles (MNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Yard	None Identified	None Required
Orifices (CNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Orifices	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.4-5 Aging Management Review Results – Feedwater System

(continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe (CNS Only)	PB	AS	Treated Water	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe (CNS Only)	PB	AS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	AS	Treated Water	Loss of Material	Chemistry Control Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.4-5 Aging Management Review Results – Feedwater System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Pipe (MNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Yard	None Identified	None Required
Pipe (MNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Pipe (CNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.4-5 Aging Management Review Results – Feedwater System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment** / **External Environment**	**Aging Effect**	**Aging Management Program or Activities**
Reservoirs	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required
Tubing (MNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Yard	None Identified	None Required

Table 3.4-5 Aging Management Review Results – Feedwater System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies (MNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Valve Bodies (CNS Only)	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.4-5 Aging Management Review Results – Feedwater System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

(2) Material

AS Low Alloy Steel
CS Carbon Steel
SS Stainless Steel

(3) The cavitating venturies are located entirely inside the carbon steel pipe of the Feedwater System and are not exposed to the external environments.

Table 3.4-6 Aging Management Review Results – Feedwater Pump Turbine Exhaust System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Expansion Joint (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Expansion Joint (Bellows) (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices (CNS Only)	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.4-6 Aging Management Review Results – Feedwater Pump Turbine Exhaust System (continued)

Component Type	Component Function (Note 1)	Material (Note 2)	Internal Environment / External Environment	Aging Effects	Aging Management Programs and Activities
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (MNS Only)
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program Flow Accelerated Corrosion Program (MNS Only)
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies (CNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Notes for Table 3.4-6 Aging Management Review Results – Feedwater Pump Turbine Exhaust System:

(1) Component Function

PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
TH	Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure provide pressure reduction, or provide differential pressure.

(2) Material

CS	Carbon Steel
SS	Stainless Steel

Table 3.4-7 Aging Management Review Results – Main Steam System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Orifices	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Orifices	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Orifices	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.4-7 Aging Management Review Results – Main Steam System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.4-7 Aging Management Review Results – Main Steam System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies (CNS Only)	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Reactor Building	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies (MNS Only)	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Yard	None Identified	None Required

Notes for Table 3.4-7 Aging Management Review Results – Main Steam System:

(1) Component Function

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.4-8 Aging Management Review Results – Main Steam Supply to Auxiliary Equipment System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Auxiliary Feedwater Pump Turbine	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Orifices	PB, TH	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.4-8 Aging Management Review Results – Main Steam Supply to Auxiliary Equipment System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Strainers (MNS Only)	PB, FI	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required

Table 3.4-8 Aging Management Review Results – Main Steam Supply to Auxiliary Equipment System (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.4-8 Aging Management Review Results – Main Steam Supply to Auxiliary Equipment System:

(1) Component Function

FI Provide filtration of process fluid so that downstream equipment and/or environments are protected.

PB Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.

TH Provide throttling so that sufficient flow and/or sufficient pressure is delivered, provide backpressure, provide pressure reduction, or provide differential pressure.

(2) Material

CS Carbon Steel
SS Stainless Steel

Table 3.4-9 Aging Management Review Results – Main Steam Vent to Atmosphere System

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material (Note 2)**	**Internal Environment / External Environment**	**Aging Effect**	**Aging Management Programs and Activities**
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Pipe	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Yard	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Tubing	PB	SS	Treated Water	Cracking	Chemistry Control Program
				Loss of Material	Chemistry Control Program
			Sheltered	None Identified	None Required
Valve Bodies	PB	CS	Treated Water	Loss of Material	Chemistry Control Program
			Sheltered	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.4-9 Aging Management Review Results – Main Steam Vent to Atmosphere System:

(1)	**Component Function**
PB	Maintain mechanical pressure boundary integrity so that sufficient flow and/or sufficient pressure are delivered, effect Containment isolation for fission product retention, or prevent physical interaction with safety-related equipment.
(2)	**Material**
CS	Carbon Steel
SS	Stainless Steel

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3.5 AGING MANAGEMENT OF CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

Note: The aging management reviews for all structures, structural components and component supports are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

The aging management review results for the Reactor Buildings, including the concrete shield building, the steel containment, the ice condenser components and all Reactor Building interior structural components, except component supports, are presented in Table 3.5-1 Aging Management Review Results – Reactor Building.

The aging management review results for structural components located within the following structures, except for component supports, are provided in Table 3.5-2 Aging Management Review Results – Other Structures:

- Auxiliary Building (including Control Building, Diesel Generator Buildings, Fuel Buildings, Groundwater Drainage System, and Main Steam Doghouses, and UHI Tank Building (Catawba only))
- Condenser Cooling Water Intake Structure – McGuire Nuclear Station fire pump rooms only
- Nuclear Service Water Structures
- Standby Nuclear Service Water Pond Dam
- Standby Shutdown Facility
- Turbine Buildings (including Service Building)
- Unit Vent Stack
- Yard Structures (including Low Pressure Service Water Intake Structure (Catawba only), Refueling Water Storage Tank foundation and missile wall, Reactor Makeup Water Storage Tank foundations (McGuire only), trenches, and Yard Drainage System (Catawba only))

The aging management review results for all equipment and component supports within the scope of license renewal are provided in Table 3.5-3 Aging Management Review Results – Component Supports.

3.5.1 AGING MANAGEMENT REVIEW RESULTS TABLES

The results of the aging management review for each structure of this section are provided in a table, as indicated above. Information contained in each table was obtained in the following manner:

Column 1 – The component types listed in Column 1 were identified through the screening methodology described in Section 2.1.2 of this application.

Column 2 – The component functions listed in Column 2 were obtained from plant specific engineering documents using the screening methodology described in Section 2.1.2.

Column 3 – The materials listed in Column 3 were obtained from plant specific engineering documents.

Column 4 – The external environments listed in Column 4 were obtained from plant specific engineering documents. These environments are as follows:

- **Below Grade –** Below grade portions of structures are exposed to back fill and groundwater. The groundwater at McGuire and Catawba is not aggressive. The McGuire groundwater pH ranges between 8.1 and 8.4; the chloride concentration is less than 20 ppm; and the sulfate concentration is less than 30 ppm. The Catawba groundwater pH ranges between 5.7 and 7.0; the chloride concentration is less than 25 ppm; and the sulfate concentration is less than 35 ppm.

- **Borated Water –** This environment is associated with the Spent Fuel Pool which contains an oxygen saturated borated water with a concentration of approximately 2000 to 4000 ppm boron.

- **Concrete –** Steel components located in concrete are protected by the alkaline environment of the concrete.

- **External –** External surfaces of structures are exposed to the external ambient environment.

- **Ice Condenser Environment –** The normal operating atmosphere in the ice condenser is at 10°F to 20°F and the absolute humidity is very low.

- **Raw Water –** This environment consists of lake water from either Lake Norman for McGuire Nuclear Station or Lake Wylie for Catawba Nuclear Station. The raw water at Lake Norman and Lake Wylie is not aggressive. The Lake Norman water pH ranges between 5.5 and 8.5; the chloride concentration is less than 15 ppm; and the sulfate concentration is less than 15 ppm. The Lake Wylie water pH ranges between 5.7 and 9.3; the chloride concentration is less than 30 ppm; and the sulfate concentration is less than 15 ppm.

- **Reactor Building –** The Reactor Building environment is moist air.

- **Sheltered –** The ambient conditions within the sheltered environment may or may not be controlled. The sheltered environment atmosphere is a moist air environment.

3.5.2 AGING MANAGEMENT PROGRAMS

The following aging management programs and activities are credited to manage the effects of aging for the structures and structural components listed in section 3.5:

- Battery Rack Inspections*
- Boraflex Monitoring Program* (McGuire only)
- Chemistry Control Program*
- Containment Inservice Inspection Plan – IWE*
- Containment Leak Rate Testing Program*
- Crane Inspection Program*
- Divider Barrier Seal Inspection and Testing Program
- Fire Protection Program*
- Flood Barrier Inspection Program (McGuire only)
- Fluid Leak Management Program*
- Ice Condenser Inspections
- Inservice Inspection Plan – IWF*
- Inspection Program for Civil Engineering Structures and Components*
- Standby Nuclear Service Water Pond Dam Inspection
- Technical Specification SR 3.6.16.3 Visual Inspection
- Underwater Inspection of Nuclear Service Water Structures*

** This aging management program/activity is equivalent to the corresponding program/activity that has been previously reviewed and found acceptable by the NRC staff during the Oconee License Renewal review, as documented in NUREG-1723.*

Based on the evaluations provided in Appendix B for the aging management programs and activities listed above, the aging effects will be adequately managed such that the intended functions of the components listed in Tables 3.5-1 through 3.5-3 will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.5-1 Aging Management Review Results – Reactor Building

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Concrete Shield Building					
Dome	2, 3, 6, 7	Concrete	Reactor Building	None Identified	None Required
			External	Change in Material Properties due to leaching	Technical Specification SR 3.6.16.3 Visual Inspection
Foundation Dowels (McGuire only)	2, 7	Steel	Concrete	None Identified	None Required
Foundation Mat	2, 7, 11	Concrete	Below Grade	None Identified	None Required
Shell Wall	2, 3, 4, 6, 7, 11	Concrete	Reactor Building	None Identified	None Required
			Below Grade	None Identified	None Required
			External	Change in Material Properties due to leaching	Technical Specification SR 3.6.16.3 Visual Inspection

Table 3.5-1 Aging Management Review Results – Reactor Building (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steel Containment					
Bellows (Penetration)	1	Stainless	Reactor Building	Cracking	Containment Leak Rate Testing Program
Electrical Penetrations	1	Steel	Reactor Building	Loss of Material	Containment Inservice Inspection Plan – IWE Containment Leak Rate Testing Program
Equipment Hatch	1	Steel	Reactor Building	Loss of Material	Containment Inservice Inspection Plan – IWE Containment Leak Rate Testing Program
Fuel Transfer Tube Penetration	1	Steel	Reactor Building	Loss of Material	Containment Inservice Inspection Plan – IWE Containment Leak Rate Testing Program
Mechanical Penetrations	1	Steel	Reactor Building	Loss of Material	Containment Inservice Inspection Plan – IWE Containment Leak Rate Testing Program
Personnel Air Locks	1	Steel	Reactor Building	Loss of Material	Containment Inservice Inspection Plan – IWE Containment Leak Rate Testing Program
Steel Containment Vessel	1	Steel	Reactor Building	Loss of Material	Containment Inservice Inspection Plan – IWE Containment Leak Rate Testing Program

Table 3.5-1 Aging Management Review Results – Reactor Building (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Ice Condenser Components					
Ice Baskets	2, 7	Galvanized Steel	Ice Condenser	Loss of Material	Ice Condenser Inspections
Lattice Frames & Support Columns	2, 7	Steel	Ice Condenser	Loss of Material	Ice Condenser Inspections
Lower Inlet Doors, Intermediate Deck Doors, Top Deck Doors	2, 3, 7	Steel	Ice Condenser Reactor Building	Loss of Material	Ice Condenser Inspections
Lower Support Structure	2, 7	Steel	Ice Condenser	Loss of Material	Ice Condenser Inspections
Wear Slab	2, 7	Concrete	Ice Condenser	None Identified	None Required

Table 3.5-1 Aging Management Review Results – Reactor Building (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Reactor Building Interior Structural Components					
Anchorage	2, 7, 11	Steel	Concrete	None Identified	None Required
Anchorage (exposed surface)	2, 7, 11	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Checkered Plate	3	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Embedments	2, 7, 11	Steel	Concrete	None Identified	None Required
Embedments (exposed surface)	2, 7, 11	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Equipment Pads	2, 7, 11	Concrete	Reactor Building	None Identified	None Required
Expansion Anchors	2, 7, 11	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Flood Curbs	2, 8	Concrete	Reactor Building	None Identified	None Required
Flood Curbs (Steel)	2, 8	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components

Table 3.5-1 Aging Management Review Results – Reactor Building (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Reactor Building Interior Structural Components (continued)					
Flood, Pressure, & Specialty Doors	1, 3, 8	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Fuel Transfer Canal Liner Plate	1	Stainless	Reactor Building	None Identified	None Required
Hatches	3, 6, 11	Concrete	Reactor Building	None Identified	None Required
Missile Shields	3, 6	Concrete	Reactor Building	None Identified	None Required
			External (equipment hatch missile shield)	None Identified	None Required
Pressure Seals & Gaskets	1	EPDM (Note 2)	Reactor Building	Cracking Change in Material Properties	Divider Barrier Seal Inspection and Testing Program
Reinforced Concrete Beams, Columns, Floor Slabs, Walls	1, 2, 3, 4, 6, 7, 8, 10, 11	Concrete	Reactor Building	None Identified	None Required

Table 3.5-1 Aging Management Review Results – Reactor Building (continued)

1	2	3	4	5	6
Component Type	**Component Function (Note 1)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Reactor Building Interior Structural Components (continued)					
Structural Steel Beams, Columns, Plates & Trusses	2, 7, 11	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program Inspection Program for Civil Engineering Structures and Components
Sump Liner	1	Stainless	Reactor Building	None Identified	None Required
Sump Screens (recirculation intake screen)	2	Stainless	Reactor Building	None Identified	None Required
Sumps	2	Concrete	Reactor Building	None Identified	None Required

Notes for Table 3.5-1 Aging Management Review Results – Reactor Building:

(1) Component Function

1 Provides pressure boundary and/or fission product barrier.
2 Provides structural and/or functional support to safety-related equipment.
3 Provides shelter/protection to safety-related equipment.
4 Provides rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
5 Provides Ultimate Heat Sink following a LOCA or loss of Lake Norman or Lake Wylie.
6 Serves as missile (internal or external) barrier.
7 Provides structural and/or functional support to non-safety related equipment where failure of this component could directly prevent satisfactory accomplishment of any of the required safety-related functions.
8 Provides a protective barrier for internal/external flood event.
9 Provides path for release of filtered and unfiltered gaseous discharge.
10 Provides heat sink during SBO or design basis accidents.
11 Provides structural support and/or shelter to components relied on during certain postulated fire, anticipated transients without scram, and/or station blackout events.

(2) EPDM is the acronym for ethylene propylene dienyl monomer.

Table 3.5-2 Aging Management Review Results – Other Structures

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Concrete Structural Components					
Equipment Pads	2, 7, 11	Concrete	Sheltered	None Identified	None Required
Fire Walls	4	Concrete	Sheltered	Cracking	Fire Protection Program
Flood Curbs	8	Concrete	Sheltered	None Identified	None Required
Foundation Cassions (MNS TB only)	11	Concrete	Below Grade	None Identified	None Required
Foundations	2, 7, 11	Concrete	Below Grade	None Identified	None Required
Hatches	3, 4, 6, 11	Concrete	Sheltered	None Identified	None Required
Manholes & Covers (CNS NSW only)	3	Concrete	Below Grade External	None Identified	None Required
Missile Shields (AB and NSW only)	3, 6	Concrete	Sheltered (AB only) External (AB and NSW only)	None Identified	None Required
			Raw Water (NSW only)	Loss of Material Cracking	Underwater Inspection of Nuclear Service Water Structures Inspection Program for Civil Engineering Structures and Components
Missile Shield (RWST Missile Shield Wall)	6	Concrete	External	Change in material properties due to leaching	Inspection Program for Civil Engineering Structures and Components

Table 3.5-2 Aging Management Review Results – Other Structures (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Concrete Structural Components (continued)					
Reinforced Concrete Beams, Columns, Floor Slabs, Walls	1(AB only), 2, 3, 4, 6, 7, 8 (AB only), 10 (AB only), 11	Concrete	Sheltered	None Identified	None Required
			External	Change in material properties due to leaching	Inspection Program for Civil Engineering Structures and Components
			Below Grade	None Identified	None Required
			Raw Water (NSW and LPSW (CNS))	Loss of Material Cracking	Inspection Program for Civil Engineering Structures and Components Underwater Inspection of Nuclear Service Water Structures
Roof Slabs	2, 3, 6, 7, 11	Concrete	External	Change in material properties due to leaching	Inspection Program for Civil Engineering Structures and Components
Sumps (AB only)	1, 2	Concrete	Sheltered	None Identified	None Required
Trenches (Yard only)	3, 11	Concrete	Below Grade	None Identified	None Required

Table 3.5-2 Aging Management Review Results – Other Structures (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steel Structural Components					
Anchorage	2, 7, 11	Steel	Concrete	None Identified	None Required
Anchorage (exposed surface)	2, 7, 11	Steel	Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
			External/Raw Water	Loss of Material	Inspection Program for Civil Engineering Structures and Components Underwater Inspection of Nuclear Service Water Structures
Checkered Plate	3, 11	Steel	Sheltered External	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Embedments	2, 7, 11	Steel	Concrete	None Identified	None Required
Embedments (exposed surface)	2, 7, 11	Steel	Sheltered External (Yard only)	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Table 3.5-2 Aging Management Review Results – Other Structures (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steel Structural Components (continued)					
Expansion Anchors	2, 7, 11	Steel	Sheltered External (Yard only)	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Fire Doors (AB and CNS NSW only)	4	Steel	Sheltered External (Yard only)	Loss of Material	Fire Protection Program
Flood Curbs	8	Steel	Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Flood, Pressure, & Specialty Doors (AB, TB, and CNS NSW only)	1, 3, 8	Steel	Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Foundation Dowels (MNS AB and CCW only)	2, 7, 11	Steel	Concrete	None Identified	None Required
			Below Grade	None Identified	None Required
Metal Siding (MNS Battery Rooms only)	1, 3	Steel	Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.5-2 Aging Management Review Results – Other Structures (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Steel Structural Components (continued)					
Roof (MNS Fire Pump enclosure roof cover)	11	Steel	External	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Spent Fuel Pool Liner Plate (AB only)	1, 3	Stainless	Borated Water	Loss of Material Cracking	Chemistry Control Program
Structural Steel Beams, Columns, Plates & Trusses	2, 7, 11	Steel	Sheltered External (Yard only)	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Structural Steel and Plates	2, 7	Stainless	Borated Water (AB only)	Loss of Material Cracking	Chemistry Control Program
			External/Raw Water (NSW only)	Loss of Material	Underwater Inspection of Nuclear Service Water Structures Inspection Program for Civil Engineering Structures and Components

Table 3.5-2 Aging Management Review Results – Other Structures (continued)

Component Type (Note 1)	Component Function (Note 2)	Material	Environment	Aging Effects	Aging Management Programs and Activities
Steel Structural Components (continued)					
Sump Screens (AB only)	2	Steel	Sheltered	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Trash Rack and Screens (NSW only)	2	Stainless or Steel (CNS only)	Raw Water	Loss of Material	Underwater Inspection of Nuclear Service Water Structures
Unit Vent Stack	9	Steel	Sheltered	Loss of Material	Inspection Program for Civil Engineering Structures and Components
			External	Loss of Material	Inspection Program for Civil Engineering Structures and Components
Yard Drainage System (CNS only)	7	Steel	External	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Table 3.5-2 Aging Management Review Results – Other Structures (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Other Structural Components					
Boraflex Panels (MNS AB only)	2, 7	Boraflex	Borated Water	Degradation due to Gamma irradiation	Boraflex Monitoring Program
Earthen Embankment	2, 5	Soil	External	Loss of Material Cracking	Standby Nuclear Service Water Pond Dam Inspection
Fire Barrier Penetration Seals (AB and CNS NSW only)	4	Silicone	Sheltered	Cracking Separation	Fire Protection Program
		Rubber	Sheltered	Cracking	Fire Protection Program
Flood Seals	8	Rubber Silicon	Sheltered	Cracking Change in Material Properties	Flood Barrier Inspection (MNS only) Inspection Program for Civil Engineering Structures and Components (CNS Only)
Masonry Block Walls (AB, SSF, TB only)	2, 3, 4, 7, 11	Masonry	Sheltered	Cracking	Inspection Program for Civil Engineering Structures and Components
Metal Siding (Yard only)	3	Aluminum	External	None Identified	None Required
Roofing	3, 11	Composite	External	Loss of Material	Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.5-2 Aging Management Review Results – Other Structures:

(1) Location Abbreviations

AB = Auxiliary Building
CCW = Condenser Cooling Water Intake Structure (McGuire Fire Pump Rooms only)
CNS = Catawba Nuclear Station
LPSW = Low Pressure Service Water Intake Structure (Catawba)
MNS = McGuire Nuclear Station
NSW = Nuclear Service Water Structures
RB = Reactor Building
SNSWP = Standby Nuclear Service Water Pond Dam
SSF = Standby Shutdown Facility
TB = Turbine Buildings

(2) Component Function

1 Provides pressure boundary and/or fission product barrier.
2 Provides structural and/or functional support to safety-related equipment.
3 Provides shelter/protection to safety-related equipment.
4 Provides rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
5 Provides Ultimate Heat Sink following a LOCA or loss of Lake Norman or Lake Wylie.
6 Serves as missile (internal or external) barrier.
7 Provides structural and/or functional support to non-safety related equipment where failure of this component could directly prevent satisfactory accomplishment of any of the required safety-related functions.
8 Provides a protective barrier for internal/external flood event.
9 Provides path for release of filtered and unfiltered gaseous discharge.
10 Provides heat sink during SBO or design basis accidents.
11 Provides structural support and/or shelter to components relied on during certain postulated fire, anticipated transients without scram, and/or station blackout events. (For McGuire CCW and SSF, Function 11 only applies; For Catawba LPSW and SSF, Function 11 only applies.)

(3) The Fluid Leak Management Program is applicable for structural components that are listed in this table that are only located in the Auxiliary Building.

Table 3.5-3 Aging Management Review Results – Component Supports

(Notes are located at the end of this table)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Battery Racks (AB, SSF only)	2, 11	Steel	Sheltered	Loss of Material	Battery Rack Inspections
Cable Tray & Conduit	2, 7, 11	Steel	Sheltered Reactor Building External (Yard only)	None Identified	None Required
Cable Tray & Conduit Supports	2, 7, 11	Steel	Sheltered Reactor Building External (Yard only)	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Class 1 (NSSS) Supports	2	Steel	Reactor Building	Loss of Material	Fluid Leak Management Program (Note 3) Inservice Inspection Plan – Subsection IWF Inspection Program for Civil Engineering Structures and Components
Control Boards (AB, SSF only)	2, 3, 7, 11	Steel	Sheltered	None Identified	None Required
Control Room Ceiling (AB only)	7	Steel	Sheltered	None Identified	None Required

Table 3.5-3 Aging Management Review Results – Component Supports (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Crane Rails & Girders (AB, RB only)	7	Steel	Sheltered Reactor Building	Loss of Material	Crane Inspection Program
Electrical & Instrument Panels & Enclosures	2, 3, 7, 11	Steel	Sheltered Reactor Building External (Yard only)	None Identified	None Required
Equipment Component Supports	2, 7, 11	Steel	Sheltered Reactor Building External (Yard only)	Loss of Material	Inservice Inspection Plan – Subsection IWF Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
			Raw Water (NSW only)	Loss of Material	Underwater Inspection of Nuclear Service Water Structures Inspection Program for Civil Engineering Structures and Components

Table 3.5-3 Aging Management Review Results – Component Supports (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
HVAC Duct Supports (RB, AB, SSF, and CNS NSW only)	2, 7, 11	Steel	Sheltered Reactor Building	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Instrument Racks & Frames	2, 7, 11	Steel	Sheltered Reactor Building	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Instrument Line Supports	2, 7, 11	Steel	Sheltered Reactor Building	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Lead Shielding Supports (RB and AB only)	7	Steel	Sheltered Reactor Building	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
New Fuel Storage Racks (AB only)	2	Steel	Sheltered	None Identified	None Required

Table 3.5-3 Aging Management Review Results – Component Supports (continued)

1	2	3	4	5	6
Component Type (Note 1)	**Component Function (Note 2)**	**Material**	**Environment**	**Aging Effects**	**Aging Management Programs and Activities**
Pipe Supports	2, 7, 11	Steel	Sheltered Reactor Building External (Yard only)	Loss of Material	Inservice Inspection Plan – Subsection IWF Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components
Spent Fuel Storage Racks (AB only)	2	Stainless	Borated Water	Loss of Material Cracking	Chemistry Control Program
Stair, Platform, and Grating Supports	2, 7, 11	Steel	Sheltered Reactor Building External (Yard only)	Loss of Material	Fluid Leak Management Program (Note 3) Inspection Program for Civil Engineering Structures and Components

Notes for Table 3.5-3 Aging Management Review Results – Component Supports:

(1) Location Abbreviations

AB = Auxiliary Building
CCW = Condenser Cooling Water Intake Structure (McGuire Fire Pump Rooms only)
CNS = Catawba Nuclear Station
MNS = McGuire Nuclear Station
NSW = Nuclear Service Water Structures
RB = Reactor Building
SNSWP = Standby Nuclear Service Water Pond Dam
SSF = Standby Shutdown Facility
TB = Turbine Buildings

(2) Component Function

1 Provides pressure boundary and/or fission product barrier.
2 Provides structural and/or functional support to safety-related equipment.
3 Provides shelter/protection to safety-related equipment.
4 Provides rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant.
5 Provides Ultimate Heat Sink following a LOCA or loss of Lake Norman or Lake Wylie.
6 Serves as missile (internal or external) barrier.
7 Provides structural and/or functional support to non-safety related equipment where failure of this component could directly prevent satisfactory accomplishment of any of the required safety-related functions.
8 Provides a protective barrier for internal/external flood event.
9 Provides path for release of filtered and unfiltered gaseous discharge.
10 Provides heat sink during SBO or design basis accidents.
11 Provides structural support and/or shelter to components relied on during certain postulated fire, anticipated transients without scram, and/or station blackout events. (For McGuire CCW and SSF, Function 11 only applies; For Catawba LPSW and SSF, Function 11 only applies.)

(3) The Fluid Leak Management Program is applicable for component supports only in the Auxiliary Building and the Reactor Building

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3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

Note: The aging management reviews for all non-EQ insulated cables and connections are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station unless otherwise stated.

Based on industry literature, plant operating experience and lessons learned from previous reviews performed for license renewal (1) aging effects caused by heat and radiation, (2) aging effects caused by moisture and voltage stress for medium-voltage cables, and (3) aging effects caused by boric acid ingress into connector pins are required to be included in the aging management review of non-EQ insulated cables and connections. This aging effects identification process specifically included a review of McGuire and Catawba Licensee Event Reports dealing with insulated cables and connections and is consistent with the process used in Section 3.6 of the Oconee Nuclear Station license renewal application. Details of the aging effects are provided in Table 3.6-1.

Table 3.6-1 Aging Effects Included in the Aging Management Review for Non-EQ Insulated Cables and Connections

Name	Subcomponent	Applicable Stressors	Degradation	Potential Effects
Aging effects caused by heat and radiation	Insulation material	Heat, oxygen	Embrittlement, cracking, melting, discoloration	Reduced insulation resistance (IR), electrical failure
		Radiation, oxygen	Embrittlement, cracking, discoloration, swelling	
Aging effects caused by moisture and voltage stress for inaccessible medium-voltage cables	Medium-voltage cable insulation material	Moisture and voltage stress	Formation of water trees, localized damage	Electrical failure (breakdown of insulation)
Aging effects caused by boric acid ingress into connector pins	Connector pins	Borated water	Corrosion	Connector failure

3.6.1 AGING EFFECTS CAUSED BY HEAT AND RADIATION

A bounding plant spaces approach is used to determine the required aging management programs and activities that will manage aging effects caused by heat and radiation such that the intended function non-EQ insulated cables and connections is maintained consistent with the current licensing basis for the period of extended operation.

The cable and connection material of interest for the aging management review is the primary conductor insulating material (hereafter referred to as insulation material). Using the plant spaces approach, cable and connection insulation materials with aging properties that bound the aging properties of other installed cable and connection insulation materials are identified and used in the aging management review. The bounding insulation materials for the review of aging effects caused by heat and radiation along with the insulation material 60-year service-limiting temperature and 60-year service-limiting radiation dose are listed in Table 3.6-2.

Table 3.6-2 Bounding Insulation Materials for the Review of Aging Effects Caused by Heat and Radiation

Bounding Insulation Materials	60-Year Service-Limiting Temperature	
EP, EPR, EPDM, FREP, Hypalon	Power	167°F (75°C)
PVC	I&C	112°F (44°C)
Bounding Insulation Materials	**60-Year Service-Limiting Radiation Dose**	
Hypalon, Nylon	Power, I&C	2×10^6 rads

The review of aging effects caused by heat and radiation includes the identification of the service conditions for insulated cables and connections. Service conditions include both ambient radiation and temperature with ohmic heat included for power applications. The service conditions for non-EQ insulated cables and connections are listed in Table 3.6-3. The service conditions identified in Table 3.6-3 are bounding values. These bounding values are greater than the actual values for most plant areas due to factors such as daily and seasonal temperature fluctuations and unit outages.

Table 3.6-3 Bounding Service Conditions for the Review of Aging Effects Caused by Heat and Radiation

Structure or Area	Design Ambient Temperature	Plus Ohmic Heat for Power Applications
Reactor Building Lower Containment	120°F (49°C)	162°F (72°C)
All other areas	110°F (43°C)	162°F (72°C)
Structure or Area	**Design Ambient Radiation Dose**	
Auxiliary and Reactor Buildings	6.8×10^9 rads	
All other areas	less than 3.0×10^4 rads	

Table 3.6-4 compares the temperature and radiation service conditions to the 60-year service-limiting temperature and radiation dose for the bounding insulation materials. The results of this comparison are provided in the right column of the table and are discussed following the table.

Table 3.6-4 Comparison of Service Conditions to Insulation Material 60-Year Service-Limiting Temperature and Radiation Dose

Bounding Insulation Materials	60-Year Service-Limiting Temperature and Radiation Dose	Bounding Temperature and Radiation Dose / Structure or Area	OK for 60 Years of Service
I&C applications PVC	112°F (44°C)	120°F (49°C) Reactor Buildings Lower Containment	No
Power applications EP, EPR, EPDM, FREP, Hypalon	167°F (75°C)	162°F (72°C) All Areas	Yes
Hypalon, Nylon	2 x 10^6 rads	6.8 x 10^9 rads Auxiliary and Reactor Buildings	No

There are plant areas where the bounding service conditions are greater than the 60-year service-limiting temperature or radiation dose; identified with a “No” in the right column of Table 3.6-4. This signifies that some insulation materials are not suited for the bounding service conditions for 60 years of service. Based on this finding, and choosing not to refine the service conditions for specific plant areas or to scope within insulated cables and connections, aging management is required to demonstrate reasonable assurance that the intended functions of non-EQ insulated cables and connections will be maintained consistent with the current licensing basis through the period of extended operation. A new program, the *Non-EQ Insulated Cables and Connections Aging Management Program*, will be implemented to demonstrate this reasonable assurance.

3.6.2 Aging Effects Caused by Moisture and Voltage Stress for Inaccessible Medium-Voltage Cables

Aging effects caused by moisture and voltage stress have been identified as potential aging effects for inaccessible (for example, in conduit or direct buried) non-EQ (not subject to 10 CFR 50.49 Environmental Qualification requirements) medium-voltage cables that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as exposure to long-term (over a long period such as a few years), continuous (going on or extending without interruption or break) standing water. Periodic exposures to moisture that last for shorter periods are not significant (for example, rain and drain exposure that is normal to yard cable trenches). Medium-voltage cables routed in conduit at Catawba is not a concern due to the design criteria documented in UFSAR Section 8.3.1.4.5.1, *Cable Installation*, that conduit runs are sloped for drainage.

In addition to being exposed to long-term, continuous standing water, to be identified as being susceptible to aging effects caused by moisture and voltage stress an inaccessible non-EQ medium-voltage cable must normally be energized more than 25% of the time. The time calculation includes outages.

The two criteria identified above are conservative and are used only as threshold values for an inaccessible non-EQ medium-voltage cable to be identified as susceptible to aging effects caused by moisture and voltage stress. A qualifier to these two criteria is that if an inaccessible non-EQ medium-voltage cable is designed or specified for the conditions described in these two criteria then the cable is not considered susceptible to aging effects caused by moisture and voltage stress.

To provide reasonable assurance that the intended functions of inaccessible non-EQ medium-voltage cables susceptible to aging effects caused by moisture and voltage stress will be maintained consistent with the current licensing basis through the period of extended operation a new program, the *Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program*, will be implemented.

3.6.3 AGING EFFECTS CAUSED BY BORIC ACID INGRESS INTO CONNECTOR PINS

During the Oconee License Renewal Application review potential boric acid ingress into connector pins was identified as causing aging effects that needs to be managed. The *Fluid Leak Management Program* (which includes boric acid leakage surveillance) will be credited for managing aging effects caused by boric acid ingress into non-EQ connector pins at McGuire and Catawba.

3.6.4 AGING MANAGEMENT REVIEW RESULTS TABLE

The results of the aging management review for non-EQ insulated cables and connections are provided in Table 3.6-5. Information in Table 3.6-5 was obtained from industry literature and plant specific engineering documentation as part of the aging management review.

Column 1 – The component types listed in Column 1 were obtained from plant specific engineering documentation.

Column 2 – The component function listed in Column 2 was obtained from plant specific engineering documentation.

Column 3 – The material information listed in Column 3 was obtained from plant specific engineering documentation.

Column 4 – The environment information listed in Column 4 was obtained from plant specific engineering documents.

Column 5 – The aging effects listed in Column 5 were obtained using the process described in Section 3.6 of this Application.

Column 6 – The aging management programs listed in Column 6 are credited to manage the aging effects for the period of extended operation as discussed in Sections 3.6.1, 3.6.2 and 3.6.3 or this Application.

3.6.5 AGING MANAGEMENT PROGRAMS

The following aging management programs and activities are credited to manage the effects of aging for non-EQ insulated cables and connectors listed in Section 3.6:

- Non-EQ Insulated Cables and Connections Aging Management Program*
- Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program*
- Fluid Leak Management Program*

** These aging management programs are equivalent to the corresponding programs that have been previously reviewed and found acceptable by the NRC staff during the Oconee License Renewal review, as documented in NUREG-1723.*

Based on the evaluations provided in Appendix B for the aging management programs and activities listed above, the aging effects will be adequately managed such that the intended functions of the components listed in Table 3.6-5 will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.6-5 Aging Management Review Results – Non-EQ power, Instrumentation, Control and Communication Insulated Cables and Connections

1 Component Type	2 Component Function	3 Material	4 Environment	5 Aging Effect	6 Aging Management Programs and Activities
Non-EQ insulated cables and connections	Maintain electrical connection to specified sections of an electrical circuit to deliver voltage, current or signals	Insulation materials - various organic polymers	Heat or radiation	Reduced insulation resistance (IR), electrical failure	Non-EQ Insulated Cables and Connections Aging Management Program
Inaccessible Non-EQ medium-voltage (4.16kV, 6.9kV, 13.8kV) cables	Maintain electrical connection to specified sections of an electrical circuit to deliver voltage, current or signals	Insulation materials - various organic polymers	Moisture and voltage stress	Electrical failure (breakdown of insulation)	Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program
Non-EQ connectors	Maintain electrical connection to specified sections of an electrical circuit to deliver voltage, current or signals	Connector pins - various metals	Borated water leakage	Connector failure	Fluid Leak Management Program

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4.0 TIME-LIMITED AGING ANALYSES

4.1 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

Note: The methodology to identify time-limited aging analyses described in Section 4.1 is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station.

4.1.1 BACKGROUND

Section 54.21(c) requires a list of time-limited aging analyses be provided as part of the application for a renewal license. Time-limited aging analyses are defined in §54.3 as those licensee calculations and analyses that meet six specific criteria.

§54.21 Contents of Application - technical information

(c) An evaluation of time-limited aging analyses.

(1) A list of time-limited aging analyses, as defined in §54.3, must be provided. The applicant shall demonstrate that —

(i) The analyses remain valid for the period of extended operation;
(ii) The analyses have been projected to the end of the period of extended operation; or
(iii) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation

(2) A list must be provided of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses as defined in §54.3. The applicant shall provide an evaluation that justifies the continuation of these exemptions for the period of extended operation.

§54.3 Definitions

Time-limited aging analyses, for the purposes of this part, are those licensee calculations and analyses that:

(1) Involve systems, structures, and components within the scope of license renewal, as delineated in §54.4(a);

(2) Consider the effects of aging;

(3) Involve time-limited assumptions defined by the current operating term, for example, 40 years;

(4) Were determined to be relevant by the licensee in making a safety determination;

(5) Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, and component to perform its intended functions, as delineated in §54.4(b); and

(6) Are contained or incorporated by reference in the CLB.

4.1.2 PROCESS TO IDENTIFY POTENTIAL MCGUIRE AND CATAWBA TIME-LIMITED AGING ANALYSES

The plant specific documents that were reviewed to identify potential TLAA for both McGuire and Catawba included the following:

- Duke / NRC Licensing Correspondence
- NUREG – 0422, as Supplemented, Safety Evaluation Report for McGuire Nuclear Station [Reference 4.1 - 1]
- NUREG – 0954, as Supplemented, Safety Evaluation Report for Catawba Nuclear Station [Reference 4.1 - 2]
- Updated Final Safety Analysis Report (for both McGuire and Catawba) [References 4.1 - 3, and 4.1 - 4]
- Improved Technical Specifications (for both McGuire and Catawba)
- Facility Operating Licenses (for both McGuire and Catawba)

The document set used for the search is contained in the Electronic Licensing Library (ELL). ELL contains over 30, 000 documents and consists of virtually all correspondence between Duke Energy (formerly Duke Power Company) and the NRC (and its predecessor the Atomic Energy Commission).

The information developed from the review of plant-specific source documents was reviewed to determine which calculations and analyses meet all six criteria of §54.3. The analyses and calculations that meet all six criteria were identified as either McGuire-specific or Catawba-specific time-limited aging analyses.

As required by §54.21(c)(1), an evaluation of each time-limited aging analyses must be performed to demonstrate that:

(1) the analyses remain valid for the period of extended operation;
(2) the analyses have been projected to the end of the period of extended operation; or
(3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

The results of the evaluations of the plant-specific time-limited aging analyses are presented in Sections 4.2 through 4.7 of this Application.

4.1.3 IDENTIFICATION OF EXEMPTIONS

Part 54 also requires that the application for a renewed license include a list of current plant-specific exemptions granted pursuant to §50.12 that are based on time-limited aging analyses as defined in §54.3.

A review of the McGuire docket has been performed and the results of this review identified that no §50.12 exemptions have been granted on the basis of a time-limited aging analysis as defined in §54.3.

A review of the Catawba docket has been performed and the results of this review identified that no §50.12 exemptions have been granted on the basis of a time-limited aging analysis as defined in §54.3.

4.1.4 References for Section 4.1

4.1 - 1. NUREG-0422, *Safety Evaluation Report Related to the Operation of the McGuire Nuclear Station, Units 1 and 2*, March 1978, as supplemented, U. S. Nuclear Regulatory Commission, Docket Nos. 50-369 and 50-370.

4.1 - 2. NUREG-0954, *Safety Evaluation Report Related to the Operation of the Catawba Nuclear Station, Units 1 and 2*, February 1983, as supplemented, U. S. Nuclear Regulatory Commission, Docket Nos. 50-413 and 50-414.

4.1 - 3. *McGuire Nuclear Station Updated Final Safety Analysis Report*, as revised.

4.1 - 4. *Catawba Nuclear Station Updated Final Safety Analysis Report*, as revised.

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT

The regulations governing reactor vessel integrity are in 10 CFR Part 50:

- Section 50.60 requires all light-water reactors meet the fracture toughness, pressure-temperature limits, and material surveillance program requirements for the reactor coolant boundary as set forth in Appendices G and H of 10 CFR Part 50.
- Section 50.61 contains fracture toughness requirements for protection against pressurized thermal shock.

The design bases of McGuire Nuclear Station and Catawba Nuclear Station contain calculations and analyses addressing the effects of neutron irradiation embrittlement of the reactor vessels. The calculations that had been previously in effect for the initial 40-year license have been revised and updated to address the additional twenty years of operation being requested for license renewal. These updated calculations assume that licensed activities will continue to be conducted in accordance with the facilities' current licensing basis (e.g., use of low enriched uranium dioxide fuel only). The results of these updated calculations are summarized below.

4.2.1 UPPER-SHELF ENERGY

Appendix G of 10 CFR Part 50 requires that reactor vessel beltline materials must have a Charpy Upper Shelf Energy (USE) of no less than 75 ft-lb and must maintain a Charpy USE of no less than 50 ft-lb throughout the life of the reactor vessel, unless it is demonstrated, in a manner approved by the Director, Office of Nuclear Reactor Regulation (NRR), that lower values of Charpy USE will provide margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code. The USE calculations are time-limited aging analyses because all six of the criteria contained in §54.3 are met. The USE analyses for each vessel have been projected to the end of the period of extended operation using the guidance provided in Regulatory Guide 1.99, Revision 2, *Radiation Embrittlement of Reactor Vessel Materials.* These results meet the requirement of §54.21(c)(ii).

McGuire Nuclear Station –The USE values for McGuire Units 1 and 2 reactor vessel beltline materials at 54 Effective Full Power Years (EFPY) are presented in Table 4.2-1 for McGuire Unit 1 and in Table 4.2-2 for McGuire Unit 2. All of the beltline materials in the McGuire reactor vessels have USE above the 50 ft-lb limit. The nozzle shell plate B5011-2 is the most limiting material for McGuire Unit 1 with a 54 EFPY USE value of 53 ft-lbs. The nozzle shell to intermediate shell weld is the most limiting material for McGuire Unit 2 with a 54 EFPY USE value of greater than 55 ft-lbs. Forty-eight (48) EFPY is a traditional value assumed to be the effective full power years that would be reached at the end of the period of extended operation using an assumed capacity factor. Fifty-four (54) EFPY was used as a conservative estimate of EFPY at the time this analysis was completed.

Catawba Nuclear Station – The USE values for Catawba Units 1 and 2 reactor vessel beltline materials at 54 EFPY are presented in Table 4.2-3 for Catawba Unit 1 and in Table 4.2-4 for Catawba Unit 2. All of the beltline materials in the Catawba reactor vessels have USE above the 50 ft-lb limit. The nozzle shell forging 06 is the most limiting material for Catawba Unit 1 with a 54 EFPY USE value of 61 ft-lbs. The nozzle shell plate B8804-3 is the most limiting material for Catawba Unit 2 with a 54 EFPY USE value of 51 ft-lbs. Forty-eight (48) EFPY is a traditional value assumed to be the effective full power years that would be reached at the end of the period of extended operation using an assumed capacity factor. Fifty-four (54) EFPY was used as a conservative estimate of EFPY at the time this analysis was completed.

Table 4.2-1 Evaluation of Upper Shelf Energy for McGuire Unit 1 Beltline Region Materials at 54 EFPY

Material	Weight % of Cu	¼ T EOL Fluence (10^{19} n/cm^2)	Unirradiated USE (ft-lb)	Projected USE Decrease (%)	Projected USE @ 54 EFPY (ft-lb)
Intermediate Shell Plate B5012-1	0.11	1.83	101	11	90
Intermediate Shell Plate B5012-2	0.14	1.83	105	26	78
Intermediate Shell Plate B5012-3	0.11	1.83	112	23	86
Lower Shell Plate B5013-1	0.14	1.83	95	26	70
Lower Shell Plate B5013-2	0.10	1.83	115	22	90
Lower Shell Plate B5013-3	0.10	1.83	103	22	80
Nozzle Shell Plate B5453-2	0.14	1.83	72.4	26	54
Nozzle Shell Plate B5011-2	0.10	1.83	68.3	22	53
Nozzle Shell Plate B5011-3	0.13	1.83	94.7	25	71
Nozzle Shell Longitudinal Weld Seams 1-422A, B, C	0.199	1.63 1.13 1.63	112	38 35 38	69 73 69
Nozzle Shell to Intermediate Shell Circumferential Weld Seam	0.183	1.83	109	40	65
Intermediate Shell Longitudinal Weld Seams 2-442A, B, C	0.199	1.13 1.63 1.63	112	33 36 36	75 72 72
Intermediate Shell to Lower Shell Circumferential Weld Seam	0.051	1.83	143	22	112
Lower Shell Longitudinal Weld Seams 3-442A, B, C	0.213	1.63 1.13 1.63	124	40 37 40	74 78 74

Table 4.2-2 Evaluation of Upper Shelf Energy for McGuire Unit 2 Beltline Region Materials at 54 EFPY

Material	Weight % of Cu	¼ T EOL Fluence (10^{19} n/cm^2)	Unirradiated USE (ft-lb)	Projected USE Decrease (%)	Projected USE @ 54 EFPY (ft-lb)
Nozzle Shell Forging 06	0.25	1.73	98	38	61
Intermediate Shell Forging 05 (Using Surveillance Capsule Data)	0.153	1.73	94	24	71
Lower Shell Forging 04	0.15	1.73	141	28	102
Intermediate to Lower Shell Circumferential Weld (Using Surveillance Capsule Data)	0.039	1.73	132	3.5	127
Nozzle Shell to Intermediate Shell Weld	0.11	1.73	>71	23	>55

Table 4.2-3 Evaluation of Upper Shelf Energy for Catawba Unit 1 Beltline Region Materials at 54 EFPY

Material	Weight % of Cu	¼ T EOL Fluence (10^{19} n/cm^2)	Unirradiated USE (ft-lb)	Projected USE Decrease (%)	Projected USE @ 54 EFPY (ft-lb)
Nozzle Shell Forging 06	0.25	1.88	101	40	61
Intermediate Shell Forging 05 (Using Surveillance Capsule Data)	0.09	1.88	134	10	121
Lower Shell Forging 04	0.04	1.88	134	22	105
Intermediate to Lower Shell Circumferential Weld (Using Surveillance Capsule Data)	0.04	1.88	130	8	120
Nozzle Shell to Intermediate Shell Weld	0.03	1.88	92	22	72

Table 4.2-4 Evaluation of Upper Shelf Energy for Catawba Unit 2 Beltline Region Materials at 54 EFPY

Material	Weight % of Cu	¼ T EOL Fluence (10^{19} n/cm^2)	Unirradiated USE (ft-lb)	Projected USE Decrease (%)	Projected USE @ 54 EFPY (ft-lb)
Intermediate Shell Plate B8605-1	0.08	1.88	96	6.6	90
Intermediate Shell Plate B8605-2	0.08	1.88	82	22	64
Intermediate Shell Plate B8616-1	0.05	1.88	92	22	72
Lower Shell Plate B8806-1	0.06	1.88	83	22	65
Lower Shell Plate B8806-2	0.06	1.88	102	22	80
Lower Shell Plate B8806-3	0.06	1.88	105	22	82
Nozzle Shell Plate B8604-1	0.11	1.88	96	24	73
Nozzle Shell Plate B8604-2	0.11	1.88	89	24	68
Nozzle Shell Plate B8604-3	0.07	1.88	65	22	51
Nozzle Shell Longitudinal Weld Seams 101-122A, B, C	0.15	1.73 1.72	112	33	75
Nozzle Shell to Intermediate Shell Circumferential Weld Seam	0.13	1.88	102	31	70
Intermediate Shell Longitudinal Weld Seams 101-142A, B, C	0.04	1.13 1.88 1.88	146	10 11 11	131 130 130
Intermediate Shell to Lower Shell Circumferential Weld Seams	0.04	1.88	146	11	130
Lower Shell Longitudinal Weld Seams 101-124A, B, C	0.04	1.88 1.13 1.88	146	11 10 11	130 131 130

4.2.2 PRESSURIZED THERMAL SHOCK

The requirements of 10 CFR 50.61 are to protect against pressurized thermal shock transients in pressurized-water reactors. The screening criterion established by §50.61 is 270°F for plates, forgings, and axial welds. The screening criterion is 300°F for circumferential welds. According to this regulation, if the calculated RT_{PTS} for the limiting reactor beltline materials is less than the specified screening criterion, then the vessel is acceptable with regard to the risk of vessel failure during postulated pressurized thermal shock transients. The regulations require updating of the pressurized thermal shock assessment upon a request for a change in the expiration date of the facility operating license. The RT_{PTS} calculations are time-limited aging analyses because all six of the criteria contained in §54.3 are met. The RT_{PTS} values have been projected to the end of the period of extended operation using the methods provided in §50.61. These results meet the requirement of §54.21(c)(ii).

McGuire Nuclear Station – The RT_{PTS} results for all beltline materials are presented in Table 4.2-5 for McGuire Unit 1 and in Table 4.2-6 for McGuire Unit 2. All the beltline materials in the McGuire reactor vessels have RT_{PTS} values below the screening criteria of 270°F for plates, forgings or longitudinal welds and 300°F for circumferential welds at 54 EFPY. The lower shell plate longitudinal welds 3-442 A & C are the most limiting material for McGuire Unit 1 with a 54 EFPY PTS value of 225°F. The lower shell forging 04 is the most limiting material for McGuire Unit 2 with a 54 EFPY PTS value of 152°F.

Catawba Nuclear Station – The RT_{PTS} results for all beltline materials are presented in Table 4.2-7 for Catawba Unit 1 and in Table 4.2-8 for Catawba Unit 2. All the beltline materials in the Catawba reactor vessels have RT_{PTS} values below the screening criteria of 270°F for plates, forgings or longitudinal welds and 300°F for circumferential welds at 54 EFPY. The lower shell forging 04 is the most limiting material for Catawba Unit 1 with a 54 EFPY PTS value of 55°F. The intermediate shell plate B8605-2 is the most limiting material for Catawba Unit 2 with a 54 EFPY PTS value of 133°F.

Table 4.2-5 RT PTS Calculations for McGuire Unit 1 Beltline Region Materials at 54 EFPY

Material	CF	Fluence @ 54 EFPY (10^{19} n/cm^2)	FF	$RT_{NDT(U)}$	ΔRT_{PTS}	M	RT_{PTS} °F
Intermediate Shell Plate B5012-1	74.2	3.07	1.296	34	96.2	34	164
→ Using Surveillance Capsule Data	62.5	3.07	1.296	34	81.0	17	132
Intermediate Shell Plate B5012-2	100.3	3.07	1.296	0	130.0	34	164
Intermediate Shell Plate B5012-3	74.9	3.07	1.296	-13	97.1	34	118
Lower Shell Plate B5013-1	99.1	3.07	1.296	0	128.4	34	162
Lower Shell Plate B5013-2	65	3.07	1.296	30	84.2	34	148
Lower Shell Plate B5013-3	65	3.07	1.296	15	84.2	34	133
Intermediate Shell Plate Longitudinal Weld Seams 2-442A (0° Azimuth)	201.3	1.89	11.7	-50	235.5	56	242
→ Using Surveillance Capsule Data	156.5	1.89	1.17	-50	183.1	28	161
Intermediate Shell Plate Longitudinal Weld Seams 2-442 B, C (30° Azimuth)	201.3	2.73	1.27	-50	255.7	56	262
→ Using Surveillance Capsule Data	156.5	2.73	1.27	-50	198.8	28	177
Lower Shell Plate Longitudinal Weld Seams 3-442 A, C (30° Azimuth)	208.2	2.73	1.27	-50	264.4	56	270
→ Using Surveillance Capsule Data	194.4	2.73	1.27	-50	246.9	28	225
Lower Shell Plate Longitudinal Weld Seams 3-442 B (0° Azimuth)	208.2	1.89	1.17	-50	243.6	56	250
→ Using Surveillance Capsule Data	194.4	1.89	1.17	-50	227.4	28	205
Intermediate to Lower Shell Plate Circumferential Weld Seam 9-442	37.5	3.07	1.296	-70	48.6	48.6	27

Table 4.2-6 RT PTS Calculations for McGuire Unit 2 Beltline Region Materials at 54 EFPY

Material	CF	Fluence @ 54 EFPY (10^{19} n/cm^2)	FF	$RT_{NDT(U)}$	Δ RT_{PTS}	M	RT_{PTS} °F
Intermediate Shell Forging 05	117	2.88	1.28	-4	149.8	34	180
→ Using Surveillance Capsule Data	84	2.88	1.28	-4	107.5	17	121
Lower Shell Forging 04	115.8	2.88	1.28	-30	148.2	34	152
Circumferential Weld Metal	52.7	2.88	1.28	-68	67.5	56	56
→ Using Surveillance Capsule Data	31.5	2.88	1.28	-68	40.3	28	0

Table 4.2-7 RT PTS Calculations for Catawba Unit 1 Beltline Region Materials at 54 EFPY

Material	CF	Fluence @ 54 EFPY (10^{19} n/cm^2)	FF	$RT_{NDT(U)}$	ΔRT_{PTS}	M	RT_{PTS} °F
Intermediate Shell Forging 05	58	3.12	1.3	-8	75.4	34	101
→ Using Surveillance Capsule Data	28.4	3.12	1.3	-8	36.9	17	46
Lower Shell Forging 04	26	3.12	1.3	-13	33.8	33.8	55
Circumferential Weld Metal	54	3.12	1.3	-51	70.2	56	75
→ Using Surveillance Capsule Data	23.2	3.12	1.3	-51	30.2	28	7

Table 4.2-8 RT PTS Calculations for Catawba Unit 2 Beltline Region Materials at 54 EFPY

Material	CF	Fluence @ 54 EFPY (10^{19} n/cm^2)	FF	$RT_{NDT(U)}$	Δ RT_{PTS}	M	RT_{PTS} °F
Intermediate Shell Plate B8605-1	51	3.16	1.3	15	66.3	34	115
→ Using Surveillance Capsule Data	44	3.16	1.3	15	57.2	17	89
Intermediate Shell Plate B8605-2	51	3.16	1.3	33	66.3	34	133
Intermediate Shell Plate B8616-1	31	3.16	1.3	12	40.3	34	86
Lower Shell Plate B8806-1	37	3.16	1.3	6	48.1	34	88
Lower Shell Plate B8806-2	37	3.16	1.3	-10	48.1	34	72
Lower Shell Plate B8806-3	37	3.16	1.3	8	48.1	34	90
Intermediate, Lower and Intermediate to Lower Shell Weld Seams	37.3	3.16	1.3	-80	48.5	48.5	17
→ Using Surveillance Capsule Data	33.4	3.16	1.3	-80	43.4	28	-9

4.2.3 PRESSURE-TEMPERATURE (P-T) LIMITS

Appendix G of 10 CFR Part 50 requires heatup and cooldown of the reactor pressure vessel be accomplished within established pressure-temperature limits. These limits are established by calculations that utilize the materials and fluence data obtained through the unit specific reactor surveillance capsule program. Normally, the pressure-temperature limits are calculated for several years into the future and remain valid for an established period of time not to exceed the current operating license expiration. Calculations for the pressure-temperature limit curves for have been performed on each reactor vessel to address projected operation during the period of extended operation. These results meet the requirement of §54.21(c)(ii).

Forty-eight (48) EFPY is a traditional value assumed to be the effective full power years that would be reached at the end of the extended period of operation using an assumed capacity factor. When these analyses were completed, slightly more conservative assumptions were made regarding EFPY to ensure that if actual capacity factors were greater than those assumed, the analysis results would remain bounding.

McGuire Nuclear Station – For McGuire Unit 1 and Unit 2, the heatup and cooldown limit curves for normal operation at 50.3 EFPY provide a predicted operating window that is sufficient to conduct heatups and cooldowns.

Catawba Nuclear Station – For Catawba Unit 1 and Unit 2 the heatup and cooldown limit curves for normal operation at 51 EFPY provide a predicted operating window that is sufficient to conduct heatups and cooldowns.

4.3 METAL FATIGUE

4.3.1 ASME SECTION III, CLASS 1 COMPONENT FATIGUE

The issue of design assumptions associated with thermal fatigue of Reactor Coolant System components has been identified as a time-limited aging analysis for both McGuire Nuclear Station and Catawba Nuclear Station. Metal fatigue is a time-limited aging analysis because all six of the criteria contained in §54.3 are met. The effects of aging on the intended function(s) will be adequately managed for the period of extended operation by the *Thermal Fatigue Management Program* for each station.

4.3.1.1 Thermal Fatigue Management Program

Note: The THERMAL FATIGUE MANAGEMENT PROGRAM is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station, except as otherwise noted.

The *Thermal Fatigue Management Program* is an existing plant program. Its purpose is to manage the thermal fatigue basis for those component evaluations that include analyses containing explicit thermal cycle count assumptions. To assure these analyses remain valid for the period of extended operation, specific programmatic actions are required.

The components managed by this program are the ones shown to be acceptable by analyses that explicitly addressed thermal fatigue transient limits. As defined for license renewal, the *Thermal Fatigue Management Program* is a prevention program in that it seeks to preclude cracking due to low-cycle thermal fatigue by managing the thermal fatigue basis. Management of the thermal fatigue basis is accomplished by continually showing that the severity and number of occurrences of the transients actually occurring are enveloped by the severity and number of occurrences of the analyzed transients.

Scope – The scope of the *Thermal Fatigue Management Program* is the set of transients for the component scope requiring thermal fatigue basis confirmation for license renewal. The component scope from which the transient set is determined is:

- Reactor Coolant System Class 1 components (including piping connected to the RCS falling under the purview of NRC I.E. Bulletins 88-08 and 88-11). Fatigue environmental effects will also be addressed for the Class 1 components.

- The replacement steam generators (RSG) where the analysis set includes not only transients associated with the Class 1 portion of these steam generators, but also the transients applicable to certain non-Class 1 portions of these steam generators.

- Components falling within the *Inservice Inspection Plan* that contain flaws detected during inservice inspection (ISI) that exceeded acceptance standards, but were shown to be acceptable by fracture mechanics analyses (FMA) explicitly addressing an assumed set of thermal transient cycle limits.

- For Catawba only, four non-Class 1 heat exchangers whose design basis was assumed to be established by considering the specific thermal transient cycle limits established for the Reactor Coolant System.

The set of transients that have been assembled for this scope of components addresses each transient described in each plant's UFSAR:

McGuire Updated Final Safety Analysis Report (UFSAR) Section 5.2 and listed in UFSAR Table 5-2, "Summary of Reactor Coolant Design Transients" and Table 5-49, "BWI Replacement Steam Generator." [Reference 4.3 - 1]

Catawba Updated Final Safety Analysis Report (UFSAR) Section 3.9.1.1 and listed in UFSAR Table 3-50, "Design Transients for ASME Code Class I Piping." [Reference 4.3 - 2]

Preventive Actions – Cracking due to thermal fatigue of locations specifically designed to preclude such cracking is prevented by assuring that the thermal fatigue basis remains valid for the period of extended operation. The actions taken by the *Thermal Fatigue Management Program* are based on reliance in the standards established in ASME Section III and ASME Section XI.

Parameters Monitored or Inspected – The *Thermal Fatigue Management Program* contains specific actions which will assure the thermal fatigue basis remains valid for the period of extended operation. These actions are discussed in detail under **Monitoring & Trending** and/or **Corrective Action & Confirmation Process**.

Detection of Aging Effects – No actions are taken as part of this program to detect aging effects.

Monitoring & Trending – The three key actions of the *Thermal Fatigue Management Program* are:

1. Determining the Thermal Cycles to be Monitored and Their Character and Number of Allowed Occurrences: As described under **Scope,** the set of transient events to be managed by the *Thermal Fatigue Management Program* is derived from the associated component information. Included are their thermal and pressure profile characteristics and the minimum of the numbers of occurrences used in the evaluations. As updates occur to

associated component information such as analyzed conditions, operational practices, inservice inspection results, or, fatigue environmental effect modifications required for the extended period of operation (after 40 years), the set of transients and their limits may require revision.

2. <u>Monitoring the Thermal Cycles Experienced</u>: From continual monitoring of plant operating conditions, the responsible engineer will discover plant conditions that meet the definition of a transient cycle defined by this program. Upon discovery of each transient cycle required to be documented by the program, the responsible engineer will tabulate the cycle count and enter it into a database. For those events that are logged, the *Thermal Fatigue Management Program* specifies appropriate parameters such as minimum/maximum temperature limits and rates of temperature change that are assumed in the analysis. The logging process captures these values for review.

3. <u>Comparison of Observed Events to Allowable Events</u>: When the responsible engineer determines which transients have occurred since the previous assessment, two evaluations are performed to determine if parameters are within limits. The first evaluation compares the observed values for those parameters applicable to each transient to the limits described in the *Thermal Fatigue Management Program* (e.g. a maximum or minimum temperature limit). The second evaluation is a comparison to the allowable number of occurrences. The database information allows a comparison of the accumulated cycles to the overall allowable cycles.

Acceptance Criteria – The program acceptance criteria are to maintain the actual thermal cycle transient count within overall allowable limits for the defined transients and for each transient, to maintain actual transient thermal and pressure profile characteristics within the limits analyzed.

Corrective Action & Confirmation Process – Should the thermal and pressure profile for a specific transient be outside of the parameters defined for that transient set or should an allowable cycle count limit for a transient cycle set be approached or exceeded, the program requires that the responsible engineer identify the issue to the appropriate engineering group(s) for resolution. The corrective action program is triggered immediately if profile values are exceeded. Similarly, the corrective action program is triggered if the number of events is expected to exceed the thermal fatigue basis limits within a manageable time period. A manageable time period is the time needed to complete actions to ensure the affected components stay within acceptable cycle count limits.

Similarly, if the cycle count limit is found to be actually lower than tabulated in the UFSAR and/or other source locations, (as through ISI activities, plant modifications or re-analyses), then the corrective action program is again used to document such discrepancies and track the resolution.

Administrative Controls – The *Thermal Fatigue Management Program* actions are implemented by station work processes. These actions are required by McGuire Technical Specification 5.5.6 for Reactor Coolant System Class 1 components covered in the McGuire UFSAR, Section 5.2 and by Catawba Technical Specification 5.5.6 for Reactor Coolant System Class 1 components covered in the Catawba UFSAR Section 3.9.1.1.

Operating Experience – Thermal fatigue transients have been tracked since operation began at both McGuire and Catawba. Operating experience associated with the *Thermal Fatigue Management Program* has demonstrated that that the program continues to monitor plant transients and track the accumulation of these transients consistent with the requirements in Technical Specification 5.5.6.

Conclusions – The *Thermal Fatigue Management Program* has been demonstrated to be capable of programmatically managing the set of transients for the component scope requiring thermal fatigue basis confirmation for license renewal. The *Thermal Fatigue Management Program* described above is equivalent to the corresponding program described and evaluated in NUREG-1723, Section 4.2.3 Reference [4.3 - 3]. Based on the above review, the continued implementation of the *Thermal Fatigue Management Program* provides reasonable assurance that thermal fatigue will be managed such that the components will continue to perform their intended function(s) for the period of extended operation. This result meets the requirement of §54.21(c)(iii).

4.3.1.2 Fatigue Environmental Effects

Note: The process to evaluate the environmental effects of fatigue is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station.

4.3.1.2.1 BACKGROUND

The topic of fatigue environmental effects were previously associated with NRC Generic Safety Issue (GSI) 190, *Fatigue Evaluation of Metal Components for 60-Year Life*, more informally known as environmentally-assisted fatigue (EAF). This issue began under GSI-166, *Adequacy of Fatigue Life of Metal Components*, concerning all operating plants. In the December 31, 1997 version of NUREG-0933, *A Prioritization of Generic Safety Issues*, GSI-166 was closed for the current operating period (i.e. 40 year plant life) and was re-issued as GSI-190 for plants considering the 20 additional years associated with license renewal. The environmental fatigue issue for license renewal was finalized during the close-out of GSI-190 in December 1999. In an internal NRC memorandum [Reference 4.3 - 4], it was concluded that environmental effects would have a negligible impact on core damage frequency, and as such, no generic regulatory action was required. However, since NUREG/CR-6674 [Reference 4.3 - 5] indicated that fatigue reactor coolant environmental effects would result in an increased frequency of pipe leakage, the NRC required that utilities applying for license renewal address the effects of reactor water environment on fatigue usage in affected components.

Duke, in cooperation with the Nuclear Energy Institute (NEI), EPRI and a number of other utilities, has engaged the NRC in a dialogue associated with a means to address the concerns outlined above. In December 2000, a draft EPRI report entitled *Guidelines for Addressing Fatigue Environmental Effects in a License Renewal Application* [Reference 4.3- 6] aimed at establishing a standard approach to addressing these concerns was submitted to NRC. [Reference 4.3- 7]

4.3.1.2.2 DUKE APPROACH

The draft EPRI report, *Guidelines for Addressing Fatigue Environmental Effects in a License Renewal Application,* offers two methods for applicant utilities to address EAF for license renewal. Duke selects Method 2, Fatigue Assessment Using Environmental Factors. Briefly, Duke will follow the steps in EPRI Method 2, paraphrased and adjusted as follows:

1. Choose 6-10 plant locations for assessment. Locations for consideration will include the NUREG/CR-6260 locations and other locations expected to have high usage factors when considering EAF (See Note 1).
2. For an evaluation period, determine the EAF-adjusted CUF at these locations, using defined transient severities and/or assumed occurrences either bounding or coinciding with

realistic expectations (See Notes 2 and 3). CUF calculations may use methods less conservative than original design as appropriate. Transient definitions may coincide with design bases or may deviate as judged appropriate. Reconciliation with actual plant behavior is required in a following step.

3. Within the evaluation period, continually track the fatigue accumulating at the locations. This will be done by either tracking the incidences of the occurring transients or by taking the observed plant parameters and calculating a resulting EAF-adjusted CUF.
4. Compare either the recorded incidences of occurring transients with the number used in step 2, or compare the calculated EAF-adjusted CUF with that predicted in step 2 (See Note 3).
5. Make future projections of either the EAF-adjusted CUF or the count of transient occurrences to determine the remaining time to reaching the allowables (See Note 3). If the projections predict exceeding the allowables within a time period needed for the implementation of corrective actions to prevent this, then initiate those corrective actions at this time (See Note 1).

Note 1: The objective to meet in choosing locations will be to ensure by example that no plant location will have an EAF-adjusted CUF that exceeds 1.0 in actual operation. This will dictate that for locations chosen, any assumptions or practices followed in determining that EAF-adjusted CUFs remain below 1.0 will be applicable to those not chosen as well. For example, if a later ASME Code, or more rigorous analysis methods, or less severe transients are applied in order to show that for a given location the EAF-adjusted CUF remains < 1.0, then those same actions must be appropriate for other similar locations not explicitly chosen. If not, then representatives from the remaining population would need to be included. This includes Alternate Fatigue Management options: 3.3.1 Reanalysis, 3.3.2 Partial Cycle Counting, 3.3.3 Fatigue Monitoring, or 3.3.5 Modified Plant Operations of Reference 4.3 - 6. Employment of option 3.3.4 Flaw Tolerance and Inspection for any location shall require that similar EAF fatigue sensitive locations be found bounded by fatigue crack growth and end of period K_I (or size) for that location.

Should it not be possible to show that a projected transient accumulation rate remains less than allowable for the evaluation period chosen, corrective actions may include but not be limited to those described in Section 3.3 Alternate Fatigue Management, of Reference 4.3 - 6.

Note 2: The procedure to be used for determination of EAF-adjusted CUFs is given in Appendix B of Reference 4.3 - 6. This procedure employs an F_{en} process with an adjustment for moderate environmental effects, i.e. usage for each transient load pair is multiplied by F_{en}, where F_{en} is $F_{en,nom}/Z$, with Z=3.0 for carbon and low alloy, and 1.5

for wrought and cast stainless steels. A strain rate weighted average F_{en} may be used as described in Reference 11 of Reference 4.3 - 6.

Note 3: The choice of evaluation period will not be less than one fuel cycle, but may be as long as the time remaining to the end of the 60 year license renewal period. The objective will be to arrive at an end of period EAF-adjusted CUF that is less than 1.0, using the transient cycles expected within that time period. Care will be taken that the transient cycles used will be conservative enough that exceedance of severity or occurrences will not occur within the frequency of data collection and evaluation. Otherwise the plant will experience an un-analyzed transient (either severity or number) and plant operability evaluation and associated efforts will be triggered.

As described for the *Thermal Fatigue Management Program*, Duke will employ a monitoring scheme based on detecting, assessing, and counting plant transient events (as opposed to CUF monitoring). As such, the allowable number of occurrences for each transient then becomes the quantity assumed for the chosen evaluation period, which in turn was limited by each location's EAF-adjusted CUF remaining less than or equal to 1.0. The severity of transients are also monitored and compared to the as analyzed values. EAF-dependent variables will also either be similarly monitored and compared or be chosen such that non-exceedance is judged assured. As such, the *Thermal Fatigue Management Program* will be adjusted to include the effects of EAF only through the lowering of the allowable number of transient events and the inclusion of EAF parameters to monitor and compare.

The exercise of the above procedure will be at a time prior to the end of the 40th year of plant operation. This lead time shall be sufficient to ensure that implementation of corrective actions will prevent the exceedance of 1.0 of EAF-adjusted CUF within the extended period of operation. No requirement exists that any resulting adjustments in allowables be applied prior to the end of the initial 40 years of operation. It is recognized that a discontinuity exists at the 40 year point in the need to apply this adjustment.

Duke may choose to exercise a different course of action should the NRC approve a less restrictive approach in the future, either through agreement with the industry, or individually with us.

4.3.2 ASME Section III, Class 2 and 3 Piping Fatigue

Note: The assessment of thermal fatigue for non-Class 1 mechanical components is generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station.

Thermal fatigue of mechanical systems is considered to be a time-limited aging analysis because all six of the criteria contained in §54.3 are satisfied. Thermal fatigue of non-Class 1 components is considered to be an effect of aging and involves time-limited assumptions defined by the current term (e.g., 7000 cycles). Thermal fatigue is relevant in making a safety determination and involves conclusions related to the capability of the component to perform its intended function. The mechanical system design requirements are contained in the applicable design Code of Record. This section addresses the non-Class 1 mechanical system components falling within the scope of license renewal. The Reactor Coolant System Class 1 components and certain other non-Class 1 components are addressed in Section 4.3.1.1**.**

As background, McGuire and Catawba have a number of systems within the scope of license renewal that were designed to the requirements of ANSI B31.1 or ASME Section III Subsection NC or Subsection ND. Piping systems designed to these requirements include a stress range reduction factor to provide conservatism in the design to account for cyclic conditions due to operations. The stress range reduction factor is 1.0 as long as the location does not exceed 7000 full temperature thermal cycles during its operation.

In order to identify the specific locations where extended operation could invalidate the existing stress range reduction factor in the piping analysis, an engineering review process was developed that considered the design temperatures and operating conditions of these McGuire and Catawba mechanical systems. These mechanical systems were reviewed to determine which ones would be likely to see 7000 equivalent full temperature thermal cycles during plant operations. Results of this engineering review determined that two specific system locations at McGuire and two specific system locations at Catawba could reach 7000 equivalent full temperature thermal cycles during the period of extended operation. Each of these locations was re-evaluated to consider a higher number of cycles and the analyses were found to be acceptable. The analyses for all other locations are valid for the period of extended operation.

For license renewal, all thermal cycle count assumptions for the non-Class 1 mechanical systems are conservatively revalidated for 60 years of operation. The conservative projection of the thermal transient cycle count assumptions to the end of the period of extended operation when coupled with the resolution of the four specific locations means that the analyses are valid for the period of extended operation. The results described above are equivalent to the corresponding results described and evaluated in NUREG-1723, Section 4.2.7 [Reference 4.3 - 5]. Therefore, the full temperature thermal cycle count assumptions in the existing non-Class 1 piping analyses for mechanical components within the scope of license renewal are valid for the period of extended operation. This result meets the requirement of §54.21(c)(i).

4.3.3 REFERENCES FOR SECTION 4.3

4.3 - 1. McGuire Nuclear Station Updated Final Safety Analysis Report, as revised.

4.3 - 2. Catawba Nuclear Station Updated Final Safety Analysis Report, as revised.

4.3 - 3. NUREG-1723, *Safety Evaluation Report Related to the License Renewal of Oconee Nuclear Station*, Units 1, 2, and 3, March 2000, U. S. Nuclear Regulatory Commission, Docket Nos. 50-269, 50-270, and 50-287.

4.3 - 4. A. C. Thadani (NRC-RES) Memorandum to W. D. Travers (NRC-EDO) dated December 26, 1999, *Closeout of Generic Safety Issue 190, "Fatigue Evaluation of Metal Components for 60-Year Plant Life."*

4.3 - 5. NUREG-6674, *Fatigue Analysis of Components for 60-Year Plant Life*, June 2000, U. S. Nuclear Regulatory Commission.

4.3 - 6. Draft EPRI Report, *Guidelines for Addressing Fatigue Environmental Effects in a License Renewal Application,* Electric Power Research Institute.

4.3 - 7. D. J. Walters (NEI) letter dated December 13, 2000, *Industry Guidance for Addressing Fatigue Environmental Effects in a License Renewal Application*.

4.4 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC EQUIPMENT

Note: Discussions of environmental qualification (EQ) of electrical components in this section are generically applicable to both McGuire Nuclear Station and Catawba Nuclear Station.

The Nuclear Regulatory Commission (NRC) has established nuclear station environmental qualification (EQ) requirements in 10 CFR 50 Appendix A, Criterion 4 and in 10 CFR 50.49 [Reference 4.4 - 1]. Section 50.49 specifically requires that an EQ program be established to demonstrate that certain electrical components located in harsh plant environments (that is, those areas of the plant that could be subject to the harsh environmental effects of a loss-of-coolant-accident [LOCA], high energy line breaks [HELBs] or post-LOCA radiation) are qualified to perform their safety function in those harsh environments after the effects of inservice aging. Section 50.49 requires that the effects of significant aging mechanisms be addressed as part of environmental qualification.

4.4.1 MCGUIRE AND CATAWBA *ENVIRONMENTAL QUALIFICATION PROGRAM* BACKGROUND

The McGuire and Catawba *Environmental Qualification Program* meets the requirements of 10 CFR 50.49 for the applicable electrical components important to safety. Section 50.49 defines the scope of components to be included, requires the preparation and maintenance of a list of in-scope components, and requires the preparation and maintenance of a qualification file that includes component performance specifications, electrical characteristics and the environmental conditions to which the components could be subjected. Section 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability. Section 50.49(e) also requires replacement or refurbishment of component not qualified for the current license term prior to the end of designated life, unless additional life is established through ongoing qualification. Section 50.49(f) establishes four methods of demonstrating qualification for aging and accident conditions. Sections 50.49(k) and (l) permit different qualification criteria to apply based on plant and component vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in the DOR Guidelines, Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors [Reference 4.4 -2]; NUREG-0588, Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment [Reference 4.4 - 3]; and Regulatory Guide 1.89, Rev. 1, Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants [Reference 4.4 - 4]. Compliance with 10 CFR 50.49 provides reasonable assurance that the component can perform its intended functions during accident conditions after experiencing the effects of inservice aging.

The McGuire and Catawba *Environmental Qualification Program* manages component thermal, radiation and cyclical aging, as applicable, through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components not qualified for the current license term are to be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation.

Aging evaluations for electrical components in the McGuire and Catawba *Environmental Qualification Program* that specify a qualification of at least 40 years are time-limited aging analyses (TLAAs) for license renewal because all of the criteria contained in 10 CFR 54.3 are met.

Under 10 CFR §54.21(c)(1)(iii), the McGuire and Catawba *Environmental Qualification Program*, which implements the requirements of 10 CFR 50.49 (as further defined and clarified by the DOR Guidelines, NUREG-0588 and Regulatory Guide 1.89, Rev. 1), at the plants is viewed as an aging management program for license renewal. Reanalysis of an aging evaluation to extend the qualifications of components is performed on a routine basis as part of the McGuire and Catawba *Environmental Qualification Program*. Important attributes for the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective actions (if acceptance criteria are not met).

TLAA demonstration option (iii), which states that the effects of aging will be adequately managed for the period of extended operation, is chosen and the McGuire and Catawba *Environmental Qualification Program* will manage the aging effects of the components associated with the environmental qualification TLAA. Section 4.4.2.1.3 of the draft "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR) (August 2000) states that the staff evaluated the EQ program (10 CFR 50.49) and determined that it is an acceptable aging management program to address environmental qualification according to 10 CFR 54.21(c)(1)(iii). The evaluation referred to in the draft SRP-LR contains sections on *EQ Component Reanalysis Attributes* and *Evaluation and Technical Basis*, which is the basis of the description provided below.

4.4.2 McGuire and Catawba EQ Component Reanalysis Attributes

The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of the McGuire and Catawba *Environmental Qualification Program*. While a component life limiting condition may be due to thermal, radiation or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, an unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to McGuire and Catawba quality assurance program requirements, which requires the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed below.

Analytical Methods – The McGuire and Catawba *Environmental Qualification Program* uses the same analytical models in the reanalysis of an aging evaluation as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60 year normal radiation dose is to multiply the 40 year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging a similar approach may be used. Other models may be justified on a case-by-case basis.

Data Collection & Reduction Methods – Reducing excess conservatism in the component service conditions (for example, temperature, radiation, cycles) used in the prior aging evaluation is the chief method used for a reanalysis per the McGuire and Catawba *Environmental Qualification Program*. Temperature data used in an aging evaluation should be conservative and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors (while the motor is not running). A representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis are to be justified on a plant-specific basis. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.

Underlying Assumptions – McGuire and Catawba *Environmental Qualification Program* EQ component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Acceptance Criteria & Corrective Action – Under the McGuire and Catawba *Environmental Qualification Program*, the reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component must be refurbished, replaced, or requalified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful).

4.4.3 MCGUIRE AND CATAWBA *ENVIRONMENTAL QUALIFICATION PROGRAM* EVALUATION AND TECHNICAL BASIS

Scope – The McGuire and Catawba *Environmental Qualification Program* includes certain electrical components that are important to safety and could be exposed to harsh environment accident conditions, as defined in 10 CFR 50.49.

Preventive Actions – Section 50.49 does not require actions that prevent aging effects. McGuire and Catawba *Environmental Qualification Program* actions that could be viewed as preventive actions include (a) establishing the component service condition tolerance and aging limits (for example, qualified life or condition limit), and (b) where applicable, requiring specific installation, inspection, monitoring or periodic maintenance actions to maintain component aging effects within the bounds of the qualification basis.

Parameters Monitored or Inspected – The qualified life of a component in the McGuire and Catawba *Environmental Qualification Program* is not based on condition or performance monitoring. However, pursuant to Regulatory Guide 1.89 Rev. 1, such monitoring programs are an acceptable basis to modify a qualified life through reanalysis. Monitoring or inspection of certain environmental conditions or component parameters may be used to ensure that the component is within the bounds of its qualification basis, or as a means to modify the qualified life.

Detection of Aging Effects – Section 50.49 does not require the detection of aging effects for in-service components. As implemented by the McGuire and Catawba *Environmental Qualification Program*, monitoring or inspection of certain environmental conditions or component parameters may be used to ensure that the component is within the bounds of its qualification basis, or as a means to modify the qualified life.

Monitoring and Trending – Section 50.49 does not require monitoring and trending of component condition or performance parameters of in-service components to manage the effects of aging. McGuire and Catawba *Environmental Qualification Program* actions that could be viewed as monitoring include monitoring how long qualified components have been installed. Monitoring or inspection of certain environmental, condition, or component parameters may be used to ensure that a component is within the bounds of its qualification basis or as a means to modify the qualification.

Acceptance Criteria – Section 50.49 acceptance criteria, as implemented by the McGuire and Catawba *Environmental Qualification Program*, are that an inservice EQ component is maintained within the bounds of its qualification basis, including (a) its established qualified life and (b) continued qualification for the projected accident conditions. Section 50.49 requires refurbishment, replacement, or requalification prior to exceeding the qualified life of each installed device. When monitoring is used to modify a component qualified life, plant-specific acceptance criteria are established based on applicable 10 CFR 50.49(f) qualification methods.

Corrective Action & Confirmation Process – If a component in the McGuire and Catawba *Environmental Qualification Program* is found to be outside the bounds of its qualification basis, corrective actions are implemented in accordance with the station's corrective action program. When unexpected adverse conditions are identified during operational or maintenance activities that affect the environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. When an emerging industry aging issue is identified that affects the qualification of an EQ component, the affected component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. Confirmatory actions, as needed, are implemented as part of the McGuire and Catawba corrective action program, pursuant to 10 CFR 50, Appendix B.

Administrative Controls – The McGuire and Catawba *Environmental Qualification Program* is implemented through the use of station policy, directives, and procedures. The McGuire and Catawba *Environmental Qualification Program* will continue to comply with 10 CFR 50.49 throughout the renewal period, including development and maintenance of qualification documentation demonstrating reasonable assurance that a component can perform required functions during harsh accident conditions. McGuire and Catawba *Environmental Qualification Program* documents identify the applicable environmental conditions for the component locations. McGuire and Catawba *Environmental Qualification Program* qualification files are maintained at McGuire and Catawba in an auditable form for the duration of the installed life of the component. McGuire and Catawba *Environmental*

Qualification Program documentation is controlled under the station's quality assurance program.

Operating Experience – EQ programs include consideration of operating experience to modify qualification bases and conclusions, including qualified life. Compliance with 10 CFR 50.49 provides reasonable assurance that components can perform their intended functions during accident conditions after experiencing the effects of inservice aging.

Conclusion

The McGuire and Catawba *Environmental Qualification Program* has been demonstrated to be capable of programmatically managing the qualified lives of the components falling within the scope of the program for license renewal. The McGuire and Catawba *Environmental Qualification Program* described above is equivalent to the corresponding program described and evaluated in Section 4.2.8 of NUREG-1723 [Reference 4.4 - 5]. Based on the above review, the continued implementation of the McGuire and Catawba *Environmental Qualification Program* provides reasonable assurance that the aging effects will be managed and that EQ components will continue to perform their intended functions for the period of extended operation. This result meets the requirement of §54.21(c)(iii).

4.4.4 REFERENCES FOR SECTION 4.4

4.4 - 1. 10 CFR 50.49, *Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants*, Office of the Federal Register, National Archives and records Administration, 2000.

4.4 - 2. DOR Guidelines, *Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors*, November 1979.

4.4 - 3. NUREG-0588, *Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment*, U. S. Nuclear Regulatory Commission, July 1981.

4.4 - 4. NRC Regulatory Guide 1.89, Rev. 1, *Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants*, U. S. Nuclear Regulatory Commission, June 1984.

4.4 - 5. NUREG-1723, *Safety Evaluation Report Related to the License Renewal of Oconee Nuclear Station*, Units 1, 2, and 3, March 2000, U. S. Nuclear Regulatory Commission, Docket Nos. 50-269, 50-270, and 50-287.

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4.5 CONCRETE CONTAINMENT TENDON PRESTRESS (NOT APPLICABLE)

The prestressing tendons in prestressed concrete containments lose their prestressing forces with time due to creep and shrinkage of concrete, and relaxation of the prestressing steel. During the design phase, engineers estimate these losses to arrive at the predicted prestressing forces at the end of operating life, normally forty years. The loss of tendon prestress analysis is a time-limited aging analysis for only prestressed concrete containments.

This topic is not applicable to either the McGuire Nuclear Station Ice Condenser Containments or the Catawba Nuclear Station Ice Condenser Containments. Ice condenser containments do not use prestressed tendons.

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4.6 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATION FATIGUE ANALYSIS

The containment liner plates, metal containments, penetration sleeves (including dissimilar metal welds), and penetration bellows may be designed in accordance with requirements of Section III of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. If a plant's code of record requires a fatigue analysis, then this fatigue analysis may be a TLAA and must be evaluated to ensure that the effects of aging on the intended functions will be adequately managed for the period of extended operation.

4.6.1 CONTAINMENT LINER PLATES

Prestressed concrete containments have containment liner plates. McGuire and Catawba are ice condenser containments and do not have containment liner plates. Therefore, the topic of a fatigue analysis for containment liner plate is not applicable for either McGuire Nuclear Station or Catawba Nuclear Station.

4.6.2 METAL CONTAINMENTS

The McGuire and Catawba ice condensers containments are metal containments, also know as Steel Containment Vessels (SCV). These Steel Containment Vessels are described in the Section 2.4 of this Application. The design Code of Record for the McGuire SCV is Section B, Section III, of the ASME Boiler and Pressure Vessel Code, 1968 Edition, including all addenda and code cases through Summer 1970 [Reference 4.6 - 1, Section 3.8.2.2]. For Catawba, the design Code of Record is Subsection NE, Section III, of the ASME Boiler and Pressure Vessel Code, 1971 Edition, including all addenda through the Summer of 1972 [Reference 4.6 - 2, Section 3.8.2.2].

Typical hot penetration assemblies are shown on UFSAR Figure 3-68 for McGuire and Figure 3-13 for Catawba. The hot penetration consists of three major components: a) process line and flued head, b) guard pipe, and c) expansion bellows [Reference 4.6 - 1, Section 3.9.2.8.2 and Reference 4.6 - 2, Section 3.6.2.4.2]. Of these three major components, the bellows design accommodates displacements between the SCV and Reactor Building due to thermal, seismic, and containment test conditions [Reference 4.6 - 1, Section 3.9.2.8.2 and Reference 4.6 - 2, Section 3.6.2.4.2]. Fatigue is a progressive failure of a structural part under repeated, cyclic, or fluctuating loads. Because of the bellows design, the piping loads which could cause fatigue are not transferred to the SCV. No fatigue analysis was required for the SCV; therefore, containment fatigue is not a time-limited aging analysis for either McGuire Nuclear Station or Catawba Nuclear Station.

4.6.3 BELLOWS

Mechanical penetrations are provided with bellows to accommodate differential movement between the containment and the Reactor Building for thermal, seismic, and containment test conditions [Reference 4.6 - 1, Section 3.9.2.8.2 and Reference 4.6 - 2, Section 3.6.2.4.2]. Typical details of bellows are shown in McGuire UFSAR Figure 3-68 and Catawba Figure 3-13. All bellows expansion joints are of two-ply construction with a wire mesh between plys for testability of bellows and bellows weld to piping [Reference 4.6 - 1, Section 3.9.2.8.1 and Reference 4.6 - 2, Section 3.6.2.4.1]. The design and time-limited aging analysis evaluation are plant specific as described below.

4.6.3.1 McGuire Design and Time-Limited Aging Analysis Evaluation

The McGuire bellows assemblies are manufactured, installed, and examined in accordance with ASME Section III 1971 edition paragraph NC-3649. Design requirements for the bellows are contained in McGuire engineering documents.

The 1971 Code required the manufacturer to consider the combined stress due to pressure and deflection versus the stress to failure at the design cyclic life as a part of the bellows design. The cyclic life data was based on actual experiments in which bellows designs, similar to those installed, were cycled to failure. In addition, the design code included a 175% safety margin in the bellows design. This requirement assured a conservative design. A search of Duke engineering records did not locate any manufacturer's records for a fatigue calculation on the original design for McGuire.

During later modifications at McGuire, the bellow's manufacturer reviewed the bellows design for revised feedwater penetration movements. The manufacturer calculated the new cycle life for the Feedwater bellows to be 32,782 cycles. Although not part of the original design, this cycle life is well beyond what the bellows would see during normal operation. In order for the bellows to cycle 32,782 times over 60 years, the bellows would have to cycle more than once a day.

Fatigue of bellows is not a time-limited aging analysis for McGuire Nuclear Station because Criterion (4) of §54.3 is not met. The bellows fatigue analysis was determined not to be relevant by Duke in making any safety determination.

While fatigue of bellows has not been determined to be a time-limited aging analysis for McGuire, the aging effect which could result from cyclic fatigue, cracking, has been identified as an aging effect requiring management for the bellows for the period of extended operation. Local leak rate testing has been identified as the program that manages cracking of the bellows. The local leak rate testing is discussed as part of *Containment Leak Rate Testing Program*.

4.6.3.2 Catawba Design and Time-Limited Aging Analysis Evaluation

The Catawba bellows assemblies are manufactured, installed, and examined in accordance with ASME Section III 1974 edition paragraph NC-3649. Design requirements for the bellows are contained in Catawba engineering documents.

The Code requirements for bellows design evolved throughout the design of McGuire and Catawba. The 1974 edition ASME Section III paragraph NC-3649 added the requirement that the cumulative effect of stress cycles be evaluated for the cyclic life. The additional requirements were adopted from the Expansion Joint Manufacturers Association (EJMA), Inc. These requirements also assured a conservative design.

The manufacturer provided calculations for the cyclic life evaluation for each type of penetration. These cycle life values were used by the manufacturer to demonstrate that the design met the Code requirements.

Fatigue of bellows is not a time-limited aging analysis for Catawba Nuclear Station because Criterion (4) of §54.3 is not met. Although a cyclic life evaluation was performed by the vendor for the bellows, the bellows fatigue analysis was determined not to be relevant by Duke in making any safety determination.

While fatigue of bellows has not been determined to be a time-limited aging analysis for Catawba, the aging effect which could result cyclic fatigue, cracking, has been identified as an aging effect requiring management for the bellows for the period of extended operation. Local leak rate testing has been identified as the program that manages cracking of the bellows. The local leak rate testing is discussed as part of *Containment Leak Rate Testing Program*.

4.6.4 REFERENCES FOR SECTION 4.6

4.6 - 1. *McGuire Nuclear Station Updated Final Safety Analysis Report,* as revised.

4.6 - 2. *Catawba Nuclear Station Updated Final Safety Analysis Report*, as revised.

4.7 OTHER PLANT SPECIFIC TIME-LIMITED AGING ANALYSES

4.7.1 REACTOR COOLANT PUMP FLYWHEEL FATIGUE

The reactor coolant pump motors at McGuire and Catawba are of the same design. The reactor coolant pump motors are large, vertical, squirrel cage, induction motors. The motors have flywheels to increase rotational-inertia, thus prolonging pump coastdown and assuring a more gradual loss of main coolant flow to the core in the event that pump power is lost. The flywheel is mounted on the upper end of the rotor, below the upper radial bearing and inside the motor frame. The aging effect of concern is fatigue crack initiation in the flywheel bore key way from stresses due to starting the motor. Therefore, this topic is considered to be a time-limited aging analysis for license renewal because all of the criteria contained in §54.3 are met.

To estimate the magnitude of fatigue crack growth during plant life, an initial radial crack length of 10 % of the distance through the flywheel (from the keyway to the flywheel outer radius) was conservatively assumed. The analysis assumed 6000 cycles of pump starts and stops for a 60-year plant life. Reaching 6000 starts in 60 years would require a pump start on average every 3.7 days. Since a pump start normally occurs every 200 to 300 days, on average, the design of the reactor coolant pump flywheels is conservative. In addition, crack growth from postulated flaws in each flywheel is only a few mils [Reference 4.7 - 1]. The existing analysis is valid for the period of extended operation, meeting the requirement of §54.21(c)(i).

4.7.2 LEAK-BEFORE-BREAK ANALYSES

Leak-before-break (LBB) analyses evaluate postulated flaw growth in the primary loop piping of the Reactor Coolant System. These analyses consider the thermal aging of the cast austenitic stainless steel material of the piping as well as the fatigue transients that drive the flaw growth over the operating life of the plant. Because all of the criteria contained in §54.3 are met, leak-before-break is a TLAA for both McGuire Nuclear Station and Catawba Nuclear Station.

As background, the successful application of LBB to the McGuire Reactor Coolant System primary loop piping is described in WCAP-10585, *Technical Basis For Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis For McGuire Units 1 and 2* [Reference 4.7 - 2]. Likewise, the successful application of LBB to the Catawba Reactor Coolant System primary loop piping is described in WCAP-10546, *Technical Basis For Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis For Catawba Units 1 and 2* [Reference 4.7 - 3]. These reports provide the technical basis for evaluating postulated flaw growth in the main Reactor Coolant System piping under normal plus faulted loading conditions.

The first analysis consideration that could be influenced by time is the material properties of the cast austenitic stainless steel. Cast austenitic stainless steels used in the Reactor Coolant System are subject to thermal aging during service. This thermal aging causes an elevation in the yield strength of the material and a degradation of the fracture toughness, the degree of degradation being a function of the level of ferrite in the material. Thermal aging in these stainless steels will continue until a saturation or fully aged point is reached. WCAP-10456, *The Effects of Thermal Aging on the Structural Integrity of Cast Stainless Steel Piping for Westinghouse Nuclear Steam Supply Systems* [Reference 4.7 - 4] presented a detailed study of the effects of thermal aging on piping integrity. This report concluded that the thermal aging process does not significantly change the failure characteristics of the cast stainless steel piping. WCAP-10585 (McGuire) and WCAP-10546 (Catawba) used the findings of this report to make the determination that the material properties in WCAP-10456 were bounding for McGuire and Catawba. Fully aged, lower bounding data was used in performing the leak-before-break evaluation. Additionally during the license renewal review, the lower bound data in WCAP-10456 was compared to the lower bound data in NUREG 6177 [Reference 4.7 - 5] and found to be comparable. Therefore, because the original analysis supporting leak-before-break relied on fully aged stainless steel material properties, the analysis does not have a material property time-dependency that requires further evaluation for license renewal.

The second analysis consideration that could be influenced by time is the accumulation of actual fatigue transient cycles over time that could invalidate the fatigue flaw growth analysis that was done as part of the leak-before-break analysis. A review of the accumulation of the applicable fatigue transient cycles is considered to meet the TLAA definition. This review has been done within the scope of the *Thermal Fatigue Management Program*. The *Thermal Fatigue Management Program* has been demonstrated to be capable of programmatically managing the Class 1 thermal fatigue design basis, including the assumptions in the leak-before-break analysis, for the period of extended operation. The *Thermal Fatigue Management Program* is equivalent to the corresponding program described and evaluated in NUREG-1723, Section 4.2.3. The continued implementation of the *Thermal Fatigue Management Program* provides reasonable assurance that thermal fatigue will be managed for the Class 1 components such that they will continue to perform their intended function(s) for the period of extended operation. This result meets the requirement of §54.21(c)(iii) for both McGuire Nuclear Station and Catawba Nuclear Station.

4.7.3 DEPLETION OF NUCLEAR SERVICE WATER POND VOLUME DUE TO RUNOFF

McGuire Nuclear Station – The depletion of Nuclear Service Water Pond Volume due to runoff time-limited aging analysis is not applicable to McGuire. The drainage area serving the McGuire Nuclear Service Water Pond is such that the run-off and resulting sedimentation are negligible. The volume of the McGuire Nuclear Service Water Pond been previously reviewed and accepted by the NRC in the initial McGuire Safety Evaluation Report, Section 4.2 [Reference 4.7 - 6].

Catawba Nuclear Station – The Standby Nuclear Service Water (SNSW) Pond is a nuclear safety related impoundment constructed by placing a dam across a small cove of Lake Wylie. Because of the design of the Standby Nuclear Service Water Pond, an analysis was performed to predict the total loss of volume in the pond due to sedimentation during the 40 year plant life. This analysis is described in the Catawba UFSAR Section 2.4.8 [Reference 4.7 - 7] and the Catawba SER Section 2.4.4.2 [Reference 4.7 - 8]. The analysis estimated that the Standby Nuclear Service Water Pond volume would be depleted by about 10 acre-feet of sediment during the 40-year plant life.

Because all of the criteria contained in §54.3 are met, the sedimentation of the Standby Nuclear Service Water Pond over time is a time-limited aging analysis for Catawba Nuclear Station. TLAA demonstration option (iii), which states that the effects of aging will be adequately managed for the period of extended operation, is chosen to manage the Standby Nuclear Service Water Pond sedimentation TLAA. The *Standby Nuclear Service Water Pond Volume Program* manages the volume of water in the pond.

Catawba Technical Specification [SR] 3.7.9.1 requires that the water level of the SNSW pond remain greater than or equal to 571 feet mean seal level. This requirement ensures that a sufficient volume of water is available to allow the nuclear service water system to operate for at least 30 days following the design basis LOCA. SNSW Pond level is monitored and makeup water is provided should the pond level drop to 571.5 feet. Technical Specification 3.7.9 requires immediate makeup to restore level or the station is shutdown. The minimum allowable includes margin to account for evaporation and the use of SNSW Pond water for fire protection, assured auxiliary feedwater, assured component cooling makeup, and assured fuel pool makeup for the full 30 days after a postulated accident [Reference 4.7 - 7, Section 9.2.5.4].

Catawba UFSAR Figure 9-54 contains the area volume curves which are used in the thermal analysis for the ultimate heat sink. The UFSAR also includes a commitment that soundings will be taken around the SNSW intake structure at 5 year intervals to assure that sediment deposits will not adversely affect the operation of the nuclear service water system. Although an earlier calculation for the volume of the Standby Nuclear Service Water (SNSW) Pond was documented, more recent calculations have been performed which validate the volume of water in the SNSW Pond.

Scope – The scope of the *Standby Nuclear Service Water Pond Volume Program* includes the volume of water in the SNSW Pond.

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

Parameters Monitored or Inspected – The *Standby Nuclear Service Water Pond Volume Program* requires a topographic survey of the pond to determine the topography of the bottom of the SNSW Pond. Calculations are then performed using the survey data to determine the volume of water within the SNSW Pond.

Detection of Aging Effects – No actions are taken as part of this program to detect aging effects.

Monitoring & Trending – The design parameter (volume of water within the SNSW Pond) is validated using the *Standby Nuclear Service Water Pond Volume Program*. Conventional methods of surveying and volume calculation are used. A contour map with a known scales is developed as a result of the survey. Areas at the different elevations are determined. Using the contour intervals and the area at each contour interval, volumes are computed for each contour elevation. The computed (surface) areas and the volume of water (below the specified pond surface elevations) at each contour elevation are compared to the areas and volumes in Figure 9-54 in the Catawba UFSAR to ensure that an adequate volume of water is available.

The *Standby Nuclear Service Water Pond Volume Program* is performed once every three years.

The *Standby Nuclear Service Water Pond Volume Program* is documented and retained in sufficient detail to permit adequate confirmation of the results. The accountable engineer is responsible for reviewing the findings and determining whether or not the results are acceptable.

Acceptance Criteria – The acceptance criteria are contained in the area-volume curve shown in Catawba UFSAR Figure 9-54. Calculated areas and volumes are compared to the criteria in Figure 9-54.

Corrective Action & Confirmation Process – Where the calculations do not meet the acceptance criteria, the results are deemed unacceptable and documented under the corrective action program.

Administrative Controls – The level of the SNSW Pond is governed by Technical Specification (SR) 3.7.9.1. The survey of the SNSW Pond is implemented in accordance with plant procedures as required by Technical Specification 5.4.

Operating Experience – Previous surveys and calculations have verified that the (surface) area and volume of water in the Standby Nuclear Service Water Pond is sufficient.

Conclusion

The design parameter (volume of water within the SNSW Pond) is validated using the *Standby Nuclear Service Water Pond Volume Program*. For license renewal, the TLAA associated with the volume of water in the Standby Nuclear Service Water Pond is resolved in accordance with §54.21(c)(1)(iii). Based on the above review, it is reasonable to expect that the continued implementation of the *Standby Nuclear Service Water Pond Volume Program* will verify that the volume of water within the SNSW Pond is consistent with the current licensing basis throughout the period of extended operation for Catawba Nuclear Station.

4.7.4 REFERENCES FOR SECTION 4.7

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

4.7 - 2. 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.

4.7 - 3. 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.

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

4.7 - 5. NUREG-6177, *Assessment of Thermal Embrittlement of Cast Stainless Steels,* May 1994, U. S. Nuclear Regulatory Commission.

4.7 - 6. NUREG-0422, *Safety Evaluation Report Related to the Operation of the McGuire Nuclear Station, Units 1 and 2,* March 1978, as supplemented, U. S. Nuclear Regulatory Commission, Docket Nos. 50-369 and 50-370.

4.7 - 7. Catawba Nuclear Station Updated Final Safety Analysis Report, as revised.

4.7 - 8. NUREG-0954, *Safety Evaluation Report Related to the Operation of the Catawba Nuclear Station, Units 1 and 2,* February 1983, as supplemented, U. S. Nuclear Regulatory Commission, Docket Nos. 50-413 and 50-414.