UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

September 9, 2002

Mr. M. S. Tuckman
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SUBJECT: MCGUIRE AND CATAWBA NUCLEAR STATIONS - NRC INSPECTION REPORT 50-369/02-06, 50-370/02-06, 50-413/02-06 AND 50-414/02-06

Dear Mr. Tuckman:

On July 26, 2002, the NRC completed an inspection regarding your application for license renewal for the McGuire and Catawba Nuclear Stations. The enclosed inspection report presents the results of that inspection. The results of this inspection were discussed with members of your staff on July 26, 2002, in a public exit meeting at the Duke Energy Corporation offices.

The purpose of this inspection was to examine activities that support your application for renewed license for the McGuire and Catawba facilities. The inspection consisted of a selected examination of procedures and representative records, and interviews with personnel regarding your proposed aging management programs to support license extension. In addition, for a sample of plant systems, inspectors performed a visual examination of accessible portions of the systems to observe any effects of equipment aging.

The inspection concluded that the existing aging management programs are being conducted as described in your License Renewal Application and your plans for new aging management programs appear acceptable to manage plant aging.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this report, please contact Caudle Julian at (404) 562 - 4603.

Sincerely,

\RA by Loren Plisco For

Victor M. McCree, Deputy Director
Division of Reactor Projects

Docket Nos. 50-369, 50-370 and 50-413, 50-414
License Nos. NPF-9, NPF-17 and NPF-35, NPF-52

Enclosure: NRC Inspection Report w/attachments

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.	50-369, 50-370 and 50-413, 50-414
License Nos.	NPF-9, NPF-17 and NPF-35, NPF-52
Report No:	50-369/02-06, 50-370/02-06, 50-413/02-06 AND 50-414/02-06
Licensee:	Duke Energy Corporation (DEC)
Facility:	McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2
Location:	12700 Hagers Ferry Rd. Huntersville NC 28078 4830 Concord Rd. York SC 29745
Dates:	July 8 - 26, 2002
Inspectors:	B. Crowley, Reactor Inspector M. Farber, Reactor Inspector RIII R. Moore, Reactor Inspector K. Van Doorn, Reactor Inspector H. Wang, Operations Engineer, NRR
Approved by:	Caudle Julian Team Leader Division of Reactor Safety

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SUMMARY OF FINDINGS

IR 05000369-02-06, IR 05000370-02-06, 05000413-02-06, 05000414-02-06; 07/08-26 /2002; Duke Energy Corporation, McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2. License Renewal Inspection Program, Aging Management Programs.

This inspection of License Renewal activities was performed by five regional office engineering inspectors, and one staff member from the office of Nuclear Reactor Regulation. The inspection program followed was NRC Manual Chapter 2516 and NRC Inspection Procedure 71002. This inspection did not identify any "findings" as defined in NRC Manual Chapter 0612.

The inspection concluded that the existing aging management programs are being conducted as described in your License Renewal Application (LRA). Discussions with engineering staff and review of available documentation for expansion of existing programs and creation of new aging management programs demonstrated that plans were consistent with the LRA and appear acceptable to manage plant aging.

At McGuire, the Applicant identified during this inspection that there was no surveillance procedure for a visual inspection of the exposed surfaces of fire rated assemblies on an 18-month frequency as required by Selected Licensee Commitment TR16.9.5.7. This situation has existed since 1990. At Catawba, the Applicant identified that two fire protection surveillances were being performed but, were not being correctly documented.

The inspectors noted that the Applicant was progressing toward implementation of aging management programs. The Applicant had a written program document for Reactor Vessel Integrity and had a draft program for the Reactor Vessel Interals inspections. The inspectors observed that the Applicant had a good draft plan for tracking and implementing procedure changes and other actions needed to implement future aging management programs. Full implementation will be confirmed during a future inspection.

The inspectors performed numerous visual inspections on portions of plant equipment to attempt to observe aging effects. The overall condition of plant equipment was generally very good. At Catawba, in the pump house intake structure, the inspector observed some piping with heavy corrosion caused by continuous spray from pump seal leakoff. The Applicant took measurements to verify that the pipe wall thickness had not corroded below minimum allowable.

Attachment 1 presents a partial list of persons contacted and a list of the documents reviewed. Attachment 2 presents the inspection sample selected. Attachment 3 presents a list of acronyms used in this report.

Report Details

I. Inspection Scope

This inspection was conducted by NRC Region II inspectors, a Region III inspector, and members of the NRR staff to interview Applicant personnel and to examine a sample of documentation which supports the license renewal application (LRA). This inspection reviewed the implementation of the Applicant's Aging Management Programs. The team reviewed supporting documentation and interviewed Applicant personnel to confirm the accuracy of the LRA conclusions. Unless specifically stated otherwise, the Aging Management Programs were reviewed for both sites.

For a sample of plant systems, inspectors performed visual examination of accessible portions of the systems to observe any effects of equipment aging. Attachment 1 of this report lists the Applicant personnel contacted and the documents reviewed. The Aging Management Programs selected for inspection are listed in Attachment 2 of this report. A list of acronyms used in this report is provided in Attachment 3.

II. Findings

A. Review of Mechanical Aging Management Programs

1. Inservice Inspection (ISI) Plan

The ISI Plan (Program), an existing program, is credited in the LRA as an aging management program for the ASME Class 1 reactor coolant (RC) system, including exterior surfaces and bolted closures; piping, valve bodies, and pump casings; pressurizer; reactor vessel and CRDM pressure boundary components; reactor vessel internals; and steam generators (including some secondary side components). In addition, the ISI Program is credited as an aging management program for component supports. The McGuire Unit 1 ISI program has been converted to a risk-informed (RI) ISI program (based on Westinghouse Topical Report WCAP-14572) for the 3rd Interval. The applicable Code is ASME Section XI, 1995 Editon. Plans are to convert the McGuire Unit 2 program to RI after completion of the 2nd Interval. The current Code for McGuire Unit 2 is the 1989 Edition of ASME Section XI. Both Units at Catawba are in the 2nd Interval and the applicable Code is ASME Section XI, 1989 Edition.

The ISI Program is credited for managing loss of material, cracking, loss of pre-load, and reduction in fracture toughness for: stainless steel, cast stainless steel, nickel-based alloy, low alloy steel, and carbon steel. The program consists of performing surface and volumetric nondestructive examinations of piping and components in accordance with the ASME Boiler and Pressure Vessel Code and other augmented requirements such as NUREGs, Generic Letters, etc. The ISI Program is controlled by:

> Third Interval Inservice Inspection Plan McGuire Nuclear Station Unit 1 - General Requirements and Volume 1, Revision 0
>
> Second Interval Inservice Inspection Plan McGuire Station Units 1 & 2 - General Requirements and Volume 1, Revision 3
>
> Catawba Nuclear Station Second Ten-Year Interval Inservice Inspection Plan

The program documents are updated each 10-year interval and submitted to the NRC for approval of any relief requests. Inspection plan and procedures implement the program.

The inspectors reviewed the applicable Aging Management Activity/Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. To verify that the ISI Program was in place and was being implemented, the inspectors reviewed the above program documents (ISI Plans), discussed various aspects of the program with responsible Applicant personnel, and reviewed inspection plans and results as listed in Attachment 1 of this report.

Also, periodic inspections of ISI activities are performed by NRC ISI inspectors during outages. Recent inspections have found activities to be performed in accordance with program and plan requirements.

During the review, the inspectors identified the following discrepancies when comparing the ISI Plans with Section B3.20 and Table 3.1-1 of the McGuire and Catawba LRA:

> Table 3.1-1 of the LRA lists the ISI Plan as an aging management program for loss of material and cracking of pressurizer surge and spray nozzle thermal sleeves. The McGuire and Catawba ISI Plans do not include these components.
>
> Table 3.1-1 of the LRA lists the ISI Plan as an aging management program for cracking and loss of material of the steam generator divider plates. The McGuire and Catawba ISI plans do not include these components.

In both cases, the ISI plans were not the only aging management programs referenced. The Applicant agreed with the discrepancies identified and stated that for the two components identified, additional aging management reviews would be performed to determine if the programs taken credit for (absent the ISI Plan) were adequate to manage aging of the pressurizer spray and surge nozzle thermal sleeves and the steam generator divider plates.

In addition to the ASME Section XI Reactor Vessel Internals (RVI) Inspection that is conducted once per 10 years, the Applicant identified future aging management inspection activities for the Reactor Vessel Internals (see paragraph 4 below). Also, augmented inspections and evaluations will be performed under the ISI program for a McGuire Unit 2 cast stainless steel RC cold leg elbow to satisfy thermal embrittlement concerns. The Applicant will also include aging management of Class 1 small bore piping (less than 4" NPS) in the ISI program using a risk informed process. The risk informed ISI programs for McGuire include small bore Class 1 piping. The risk informed ISI programs for Catawba will be developed later.

The inspectors concluded that ISI activities are being conducted as described in the ISI Plans. With the exception of the discrepancies for pressurizer spray and surge nozzle thermal sleeves and the steam generator divider plates, the ISI program includes the systems and components listed in the LRA, for which the LRA credited the ISI Program for aging management. Adequate guidance had been provided to reasonably ensure that aging effects will be appropriately managed.

2. Flow Accelerated Corrosion (FAC) Program

FAC is an aggressive material thinning of carbon steel piping materials resulting from high energy steam/fluid flow. The FAC Program, an existing program, is credited in the LRA as an

aging management program for portions of the auxiliary feedwater (Catawba only), auxiliary steam, boron recycle, feedwater, liquid radwaste (Catawba only), liquid waste recycle (McGuire only), liquid waste monitor and disposal (McGuire only), steam generator blowdown recycle (Catawba only), and turbine exhaust (McGuire only) systems.

The program is credited for managing the loss of material in carbon steel piping and components and consists of monitoring the wall thickness of susceptible carbon steel piping and components in various systems, and replacing affected piping prior to failure. In many cases, FAC resistant materials are used for replacements. The program is consistent with the guidelines of EPRI NSAC-202L, Recommendations for an Effective Flow-Accelerated Corrosion Program. The program computer models susceptible systems and predicts wear rates. The model is supplemented and updated with periodic thickness inspections of selected components each cycle. Based on the model and inspection results, decisions are made on pipe replacement schedules.

The FAC Program is controlled by Engineering Support Document (ESD), Flow Accelerated Corrosion Program, Revision 3, and site specific programs and procedures as listed in Attachment 1. The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. In addition to review of the above program implementing documents (ESD and site procedures) and discussion of the program with responsible Applicant personnel, the inspectors reviewed inspection plans and the FAC inspection outage reports, as listed in Attachment 1, for past outages for each Unit to verify that the program was in place and being implemented. The inspectors also reviewed the program implementation package detailed in Applicant Specification CNS-1274.00-00-0016.

The inspectors concluded that the FAC Program was in place, had been implemented, and included the systems and components identified in the LRA and should manage aging effects as defined in the LRA. Adequate guidance had been provided to reasonably ensure that aging effects will be appropriately managed.

3. Reactor Vessel Integrity Program

The RV Integrity Program, an existing program, is credited in the LRA as an aging management program for managing reduction in fracture toughness for the RV. The program uses toughness data from test of surveillance capsule specimens to analyze Pressurized Thermal Shock (PTS), Upper Shelf Energy (USE), and to generate Pressure/Temperature (P/T) curves. Additional monitoring of fluence received by the surveillance specimens, effective full power years (EFPY), cavity dosimetry, and plant changes are used to perform these analyses. For neutron embrittlement considerations, USE and PTS calculations are time limited aging analyses per 10 CFR 54.3 that have been updated by the Applicant to cover the period of extended license.

The Reactor Vessel Integrity Management activities are controlled by the ESD Reactor Vessel Integrity Program, Applicant procedures, and engineering calculations, as listed in Attachment 1 below. The applicable requirements are detailed in the UFSARs, Technical Specifications, 10 CFR 50.61, and 10 CFR 50, Appendices G and H.

The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. In addition to review of the above program implementing document (ESD) and discussion of the program with

responsible Applicant personnel, the inspectors reviewed plant specific data, including: completed Maintenance Procedures (MPs) for removal of specimens; test results from capsule specimens; Operator Aid Computer monitoring of EFPY; and calculation results for USE, PTS, and P/T Curves, as listed in Attachment 1, to verify that the program was in place and being implemented.

Although the ESD, Reactor Vessel Integrity Program had been issued and the various aspects of the Program were in place and had been implemented, Applicant personnel indicated that improvements in the program document are planned. The inspectors concluded that the Reactor Vessel Integrity Program was in place, had been implemented, and was consistent with the description in the LRA. The program should reasonably ensure that aging effects will be appropriately managed.

4. Reactor Vessel Internals (RVI) Inspection

The RVI Inspection, is a new inspection that is credited in the LRA as an aging management program for the RVIs. The program supplements the ASME ISI Plan and is credited for managing cracking, reduction in fracture toughness, dimensional changes, and loss of pre-load in stainless steel and cast stainless steel RVI components.

This is a new program to be implemented in the period of extended license. The inspections will include visual and volumetric inspections. The inspections will be based on future characterization of RVI aging effects developed from inspection of other nuclear plants, inspection of Oconee internals, and activities of industry groups focused on internals aging effects. McGuire Unit 1 will be DEC's lead Westinghouse plant for RVI inspection, which is planned for the 5th ISI interval. Based on the results of Oconee and McGuire Unit 1 inspections, decisions will be made relative to inspection of McGuire Unit 2 and Catawba Units 1 and 2. NRR Request for Additional Information (RAI) questions the validity of use of Oconee inspection data because of different design plants (B&W versus Westinghouse). The Applicant responded by stating that additional data is needed to properly evaluate the susceptible locations for inspection and that Oconee results and results from other industry inspections will provide some data prior to the McGuire and Catawba inspections. Although no inspections are planned until the 5th McGuire ISI interval, in the period of extended operation, proposed ESD, McGuire and Catawba Reactor Vessel Internals Aging Management Program, was currently being drafted.

The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. In addition the inspectors reviewed the above proposed ESD program implementing document and discussed the planned program with responsible Applicant personnel.

The inspectors concluded that the planned inspections were in accordance with those identified in the LRA.

5. Steam Generator Surveillance Program

The Steam Generator Surveillance Program, an existing program, is credited in the LRA as an aging management program for the aging effects of cracking and loss of material in nickel-based alloys 600 and 690 steam generator tubes and plugs. In addition, based on response to NRR RAI 2.3.1-4, the program is also credited as an aging management program for cracking and loss of material in alloy steel, stainless steel, and carbon steel tube supports. In addition to

Technical Specification requirements, inspections follow the recommendations of Electric Power Research Institute (EPRI) Guidelines and Nuclear Energy Institute (NEI) 97-06, Steam Generator Monitoring Guidelines. The program includes: periodic inspection of tubing and plugs, secondary side inspections, tube integrity assessments, assessment of degradation mechanisms, primary to secondary leakage monitoring, sludge lancing, maintenance and repairs, and foreign material exclusion. The main program controls are the Steam Generator Management Program, Revision 4, and associated procedures and plans.

The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. In addition to review of the program implementing procedures and discussion of the program with responsible Applicant personnel, the inspectors reviewed the most recently completed Steam Generator Outage Reports for all four Units, as listed in Attachment 1. This review was to verify that the Steam Generator Surveillance Program was in place and being implemented. The inspectors also reviewed the completed Catawba LR program implementation package detailed in Applicant Specification CNS-1274.00-00-0016.

The inspectors concluded that the Steam Generator Surveillance Program was in place, had been implemented, and was consistent with the description detailed in the LRA. Activities in place should reasonably ensure that aging effects will be appropriately managed.

6. Thimble Tube Inspection Program

The Thimble Tube Inspection Program, an existing program, is credited in the LRA as an aging management program managing the effect of material loss due to fretting wear of thimble tubes. The program was initiated in response to NRC Bulletin 88-09 and is controlled by site calculations and implementing procedures as listed in Attachment 1.

The program consists of periodic eddy current (ECT) measurements of tube wall thickness and engineering analysis to show that the wear rate will not result in violation of minimum wall thickness through the life of the plant. The last measurements were taken in 2002 for McGuire Unit 1,1993 for McGuire Unit 2, 1999 for Catawba Unit 1, and 1998 for Catawba Unit 2. Future inspections are dictated based on wear rates.

The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. In addition to review of the above program calculations and procedures and discussion of the program with responsible Applicant personnel, the inspectors reviewed the completed inspection results for the last inspections for each unit, including the engineering evaluation that determined the acceptability of the thimble tubes. The inspectors also reviewed the completed McGuire and Catawba LR program implementation packages detailed in Applicant Specifications MCC-1274.00-00-0016 and CNS-1274.00-00-0016.

The inspectors concluded that the thimble tube inspection program had been implemented, was consistent with the description in the LRA and should manage aging effects as defined in the LRA.

7. Alloy 600 Aging Management Review

The Alloy 600 Aging Management Review is a new activity to ensure that nickel-based alloy locations are identified and adequately inspected by other programs such as the ISI Plan, the

Control Rod Drive Mechanism and Other Vessel Head Penetration Program, etc. A review will be performed to locate all of the nickle-based alloy locations at McGuire and Catawba and based on industry and Duke operating experience, inspection methods and frequency will be adjusted as needed. Based on the LRA, the review will be completed following the issuance of the renewed operating licenses and by the end of the initial license of McGuire Unit 1 and Catawba Unit 1. Proposed Engineering Support Document (ESD), Alloy 600 Aging Management Oconee, McGuire and Catawba Nuclear Stations, was being prepared at the time of the inspection.

The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification listed in Attachment 1. In addition the inspectors reviewed the above proposed ESD and discussed the planned activity with responsible Applicant personnel. The alloy 600 program will accomplish the review to determine the locations of alloy 600 and provide the details for inspection of each location. Based on these discussions, much of the review has been completed and plans are to have the Alloy 600 Aging Management Program issued by mid-2003. The inspectors concluded that the planned inspections were in accordance with those identified in the LRA.

8. Control Rod Drive Mechanism (CRDM) Nozzle and Other Vessel Closure Penetration Inspection Program

The Control Rod Drive Mechanism (CRDM) Nozzle and Other Vessel Closure Penetration Inspection Program, a new program, is credited in the LRA as an aging management program for primary water stress corrosion cracking (PWSCC) of high nickel alloy RV head penetrations and is a complimentary program to the ISI Plan. For the remainder of this report, the program is referred to as “CRDM Nozzle Inspection Program”. The Fluid Leak Management Program and the Reactor Coolant System Operational Leakage Monitoring Program are used in conjunction with the CRDM Nozzle Inspection Program to manage aging of reactor vessel head penetrations.

A proposed document on PWSCC of Reactor Vessel Closure Head Penetrations to control the inspection of CRDMs and other RV head penetrations was being prepared at the time of the inspection.

The inspectors reviewed the applicable Aging Management Program as described in the LRA and the supporting Aging Management Specification. In addition, the proposed ESD was reviewed and the program was discussed with Applicant personnel. The Applicant indicated that this program and the Alloy 600 Aging Management Review, detailed in paragraph 7 above, would actually be part of the same program, the RV head penetrations being one of the locations of nickle-based alloy.

The inspectors found that the LRA, Section B.3.9, was confusing relative to whether the inspections detailed for CRDM penetrations were inspections currently being performed or inspections to be performed in the future. The Applicant stated that the inspections detailed in the LRA were new planned future inspections that had been identified prior to the most recent industry cracking problems with CRDM nozzles, which are being handled under NRC Bulletins. The Applicant further stated that, based on Oconee experience, DEC was aware of the cracking issues prior to the issue of NRC Bulletin 2001-01 and took the Oconee experience into account during preparation of LRA Section B.3.9. Based on review of the LRA and discussions with Applicant personnel, planned inspections include both visual and volumetric inspections and are to be performed after issuance of the renewed operating licenses and the end of the

initial license for McGuire Unit 1 and Catawba Unit 1. The Unit 1 results will provide leading indicators for Unit 2 results at each station. The timing of the inspections may change based on either DEC specific experience or industry experience. Visual inspections are to be performed of all accessible CRDM type penetrations every refueling outage. A 100% visual inspection is to be performed of the bare heads during each 10 year ISI interval. Volumetric inspections will apply to the CRDM type penetrations and the head vent penetrations. The number of penetrations inspected will be based on both Duke specific experience and industry experience.

After determining that the CRDM penetration inspections detailed in the LRA were identified prior to all of the current industry inspections under NRC Bulletins 2001-01 and 2002-02, the inspectors questioned the Applicant relative to additional planned inspections in response to current CRDM cracking issues. This is also the subject of NRR RAI B.3.9-1. As noted above, the Applicant pointed out that the Oconee CRDM cracking experience had been taken into account in the LRA planned inspections. In addition, the licensee pointed out that in response to NRC Bulletins and current industry cracking issues, bare metal inspections have been performed for McGuire Unit 2 (March 2002) and Catawba Unit 1 (April 2002). The other two units are to be inspected during the next refueling outages.

The NRC staff is currently reviewing issues associated with CRDM nozzle cracking and any future regulatory actions that may be required as a result of those reviews will be addressed by the staff in a separate regulatory action.

9. Chemistry Control Program

This is an existing mitigation program which is credited for managing the aging effects of loss of material and/or cracking of components exposed to borated water, closed cooling water, fuel oil, and treated water environments. The program manages the relevant conditions that lead to the onset and propagation of loss of material and cracking which could result in loss of structure or component intended function.

The inspectors reviewed the program documentation, discussed the program with responsible station personnel, and reviewed documentation of periodic chemistry sampling and trend information. The station Chemistry Manual and Chemistry Management Procedures specified sampling scope, acceptance criteria, frequency, and corrective actions for sample results not withing the acceptance criteria. The inspectors verified that the systems and parameters presently sampled were consistent with the program description in the Application.

The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure aging effects will be appropriately managed. As implemented, there is reasonable assurance that the intended function of the fluid systems will be maintained through the period of extended operation.

10. Battery Rack Inspections

This is an existing activity which is credited with managing the loss of material that could impact the battery racks' intended function of structural support. Loss of material due to aging and cracking are the potential aging effects. The inspectors reviewed the program activity documentation, including completed annual inspection documentation, Technical Specification requirements for periodic battery inspections, and field verified the present material condition of the racks.

The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure aging effects will be appropriately managed. As implemented, there is reasonable assurance that the intended function of the fluid systems will be maintained through the period of extended operation.

11. Heat Exchanger Activities

These are performance monitoring and condition monitoring programs to manage the aging effects on heat exchangers exposed to raw water. The activities manage two aging effects. They manage the aging effects due to fouling which impact the component heat transfer function. They also manage aging effects due to the loss of material that can impact the pressure boundary function of the equipment. The scope of the heat exchanger activities includes heat exchangers in different systems which are composed of different materials and include existing, enhanced, and new programs.

The inspectors reviewed the program documentation, including completed procedures and corrective actions for existing programs. The LRA program enhancements were identified and documented in MCS-1274.00-00-0016 and CNS-1274.00-00-0016, License Renewal Commitments rev. 0. The new program commitments were documented in the UFSAR LRA Supplement, Chapter 18. New programs were required for inspection and cleaning of safety related pump motor air handling unit heat exchangers and pump motor oil coolers.

The inspectors noted two examples in which the aging management program descriptions for heat exchanger activities in the application were inconsistent with the existing and proposed practice. The existing and proposed heat exchanger maintenance activity for cleaning of heat exchanger tubes of the ECCS pump motor air handling units is to perform cleaning based on results of a heat exchanger differential pressure test (performance based activity). The program description in the application states the tubes will be cleaned periodically (prescription activity). The aging management program description for the Containment Spray (NS) heat exchangers states that eddy current testing will be performed on the perimeter tubes of each NS heat exchanger at least every 5 years. The existing practice is to do this, however there is no procedure or scheduling document that designates which tubes to be tested or the interval. The model work order for this activity designates the performance frequency “as required”. Performance is currently based on history, component engineer knowledge and budget. In both cases, current practices provide adequate monitoring of the heat exchangers’ material condition, however, the aging management program description is inconsistent with the existing and proposed activities.

The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure aging effects will be appropriately managed. As implemented, with the minor exception noted, there is reasonable assurance that the intended function of the fluid systems will be maintained through the period of extended operation.

12. Preventive Maintenance Activities - Carbon Steel Coatings Inspections

The preventive maintenance activities credited as aging management programs include the Condenser Circulating Water (RC) System Internal Coating Inspection and the Refueling Water Storage Tank (FWST) Internal Coating Inspection. These are existing programs that manage loss of material from carbon steel components by verifying the integrity of the internal protective coating.

The RC internal coating inspection addressed two purposes for license renewal. One is to manage the loss of material to the internal and external surfaces of the large diameter RC intake and discharge piping. The other was to provide symptomatic evidence of the condition of other piping systems in a similar underground environment. The RC coatings inspections are conducted at a 5 year interval. Catawba is presently in the process of removal and re-application of internal coating due to improper original application. The FWST internal coatings inspection assures the continued presence of intact coating to preclude the loss of material to the carbon steel tanks exposed to borated water. The McGuire tanks were last inspected in 1999 and some repairs were performed. The inspection frequency is 10 years. The Catawba tanks are stainless steel tanks and aging effects are addressed by the Chemistry Control Program and the Borated Water Systems Stainless Steel Inspection. The inspectors reviewed the program and activity documentation including documentation of past inspections and corrective actions.

The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure aging effects will be appropriately managed. As implemented, there is reasonable assurance that the intended function of the fluid systems will be maintained through the period of extended operation.

13. Sump Pump Systems Inspection

The Sump Pump Systems Inspection is a new activity to perform a one time inspection to characterize any loss of material to the internal and external surfaces of a limited set of mechanical components exposed to sump environments. It will detect the presence and extent of the loss of material due to crevice, general, pitting and microbiological induced corrosion. The activity will inspect components at each site located in the Diesel Generator Room Sump Pump System. This sump was selected as representative because it included all materials and environments experienced by the other sump systems in the license renewal scope. The inspection will use a volumetric examination technique to measure the parameter of wall thickness to assess material loss.

The inspectors reviewed the inspection program and discussed the program with the engineering staff. The LRA identified the actions items and criteria for the Sump Pump Systems inspection. The inspections will be conducted prior to the end of the original operating license.

There was no documentation of historic or plant specific and industry experience information to determine aging effects for this equipment. The purpose of the inspection is to assess potential aging effects. The Applicant had provided adequate guidance to ensure aging effects will be appropriately assessed and managed. When implemented, there is reasonable assurance that the intended function of the fluid systems will be maintained through the period of extended operation.

14. Borated Water System Stainless Steel Inspection (BWSSSI)

The BWSSSI is a new activity to perform a one time inspection of stainless steel components exposed to alternate wetting and drying of borated water, to characterize the potential aging that may be occurring. The scope of the activity will focus on the Containment Spray (NS) system but the results will also apply to subject components in the Refueling Water System. The program description in the application specifically identifies 12 subject locations in the NS system and states that one location at each station will be inspected and the results will be applied to the relevant portions of the NS and Refueling Water System.

The inspectors reviewed the program documentation in the application, reviewed the draft implementation plan for this program, and discussed the program with the engineering staff. These one time inspections will be conducted prior to the end of the initial operating license for each station.

The inspectors noted an item in the application which was unclear. The Refueling Water System Aging Management Review, Table 3.2-6, credits the BWSSSI as an aging management activity for the Refueling Water Storage Tanks at Catawba to assess the aging effects of cracking and loss of material. The aging management program discussion for BWSSSI (Section B.3.4) does not specifically state the tank is included and does not identify a population of components in the Refueling Water System which are included as an alternate wetting and drying borated water environment.

There was no documented information available for historic reviews regarding the aging effects due to long term exposure of stainless steel to an alternate wetting and drying borated water environment. The inspectors concluded that when these inspections are implemented, there is reasonable assurance that the intended function of the fluid systems will be maintained through the period of extended operation.

15. Selective Leaching Inspection

This is a new program being developed to perform a one-time inspection to characterize any loss of material due to selective leaching of system components exposed to raw water environments. Selective leaching (a form of galvanic corrosion) is the dissolution of one metal in an alloy at the metal surface which leaves a weakened network of corrosion products that are revealed by a Brinnell Hardness check or equivalent as reduction in material hardness. Uncertainty exists as to whether long term exposure to raw water environments could cause loss of material due to selective leaching in brass and cast iron components such that they may lose their pressure boundary function in the period of extended operation. This one-time inspection will examine brass and cast iron components exposed to raw water to detect the presence and extent of any loss of material due to selective leaching.

The program will monitor the hardness of the wetted surface of cast iron pump casings and brass valve bodies. The program will perform a Brinnell Hardness Test or equivalent on one cast iron pump casing in the exterior fire protection system at each site. The Brinnell Hardness Test or an equivalent test is most easily performed on a pump casing and will be indicative of all cast iron components. The exterior fire protection system contains a raw water environment that is susceptible to selective leaching and will be bounding for the other environments in the other systems. The selective leaching inspection will also test a sample of brass valves at each site in the interior fire protection system. Valves selected for inspection should be continuously

exposed to stagnant or low flow raw water environments. If no parameters are known that would distinguish the susceptible locations at each site, a select set of susceptible locations will be examined based on accessibility, operational, and radiological concerns. The results of this inspection will be applied to the brass components exposed to raw water environments in other systems. For McGuire, this new inspection will be completed following issuance of renewed operating licenses for McGuire Nuclear Station and by June 12, 2021 (the end of the initial license of McGuire Unit 1). For Catawba, this new inspection will be completed following issuance of renewed operating licenses for Catawba Nuclear Station and by December 6, 2024 (the end of the initial license of Catawba Unit 1).

The inspectors reviewed the program documentation and discussed the program with the engineering staff. The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure the aging effects will be appropriately managed. When implemented, there is reasonable assurance that the intended function of the cast iron pump casings and brass valve bodies in the exterior and interior fire protection systems will be maintained through the period of extended operation.

16. Treated Water Systems Stainless Steel Inspection

This is a new program being developed to perform a one-time inspection to characterize any loss of material or cracking of stainless steel components resulting from exposure to unmonitored treated water environments. An unmonitored treated water environment is one that may contain conditions that can concentrate existing levels of contaminants or that may simply start with a higher level of contaminants than those systems routinely monitored by the chemistry control program. Examples of contaminants are halogens, sulfates, and dissolved oxygen. Uncertainty exists as to whether exposure of stainless steel components located in an unmonitored treated water environment could lead to loss of material or cracking such that they may lose their pressure boundary function in the period of extended operation. This activity will inspect stainless steel components to detect the presence and extent of any loss of material or cracking.

The treated water systems stainless steel Inspection at McGuire will inspect stainless steel components, welds, and heat affected zones, as applicable, in the McGuire nuclear solid waste disposal system. The McGuire nuclear solid waste disposal system components within the scope of license renewal are a mixture of unmonitored, treated water and spent resins sluiced from demineralizers in various systems. The environment is expected to contain contaminants in excess of the limits below which a concern would not exist for cracking and loss of material in stainless steel. A concentration of any contaminants present would occur in areas of low flow or stagnant conditions. As a result, inspections will be performed in stagnant and low flow lines around the spent resin storage tanks using volumetric techniques. In addition to the volumetric examination, a visual examination of the interior of a valve will be conducted to determine the presence of pitting corrosion. The treated water systems stainless steel inspection at Catawba will inspect stainless steel components, welds, and heat affected zones, as applicable, in the drinking water system. The drinking water system receives water from the local municipality that has contaminants in excess of limits below which a concern would not exist for cracking and loss of material in stainless steel. Because of the higher starting level of contaminants, the environment in the drinking water system is more likely to lead to cracking or loss of material if it is occurring and bounds the environments of the containment valve injection water and solid radwaste systems. In addition to the volumetric examination, a visual examination of the interior of a valve will be conducted to determine the presence of pitting corrosion. Therefore,

the inspection results will serve as a leading indicator and can be applied to the containment valve injection water and solid radwaste systems. For McGuire, this new inspection will be completed following issuance of renewed operating licenses for McGuire Nuclear Station and by June 12, 2021 (the end of the initial license of McGuire Unit 1). For Catawba, this new inspection will be completed following issuance of renewed operating licenses for Catawba Nuclear Station and by December 6, 2024 (the end of the initial license of Catawba Unit 1).

The inspectors reviewed the program documentation and discussed the program with the engineering staff. The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure the aging effects will be appropriately managed. When implemented, there is reasonable assurance that the intended function of the stainless steel piping in the systems addressed in previous paragraph will be maintained through the period of extended operation.

17. Waste Gas System Inspection

This is a new program being developed to perform a one-time inspection to characterize loss of material and cracking, due to general, crevice, or pitting corrosion in carbon steel, stainless steel, and brass waste gas system components resulting from exposure to unmonitored treated water and gas environments. Unmonitored treated water is condensation of the water vapor contained in the waste gas stream and effluent from the recombiners and separators. The gas environment is a combination of nitrogen, hydrogen, oxygen, and fission product gases. Uncertainty exists as to whether exposure to these environments could cause loss of material or cracking of the waste gas system components such that they may lose their pressure boundary function in the period of extended operation. The waste gas system inspection will use a volumetric technique to inspect four sets of material/environment combinations. As an alternative, visual examination will be used should access to internal surfaces become available.

(1) For the brass seal water control valves on the waste gas compressors at Catawba exposed to unmonitored treated water, an inspection will be performed on one of the two seal water control valves.

(2) For carbon steel components exposed to unmonitored treated water environments at each site, inspections will be performed on the lower portions of decay tanks and associated drain lines where condensate is likely to accumulate. One of eight possible locations at each site will be examined.

(3) For stainless steel components exposed to unmonitored treated water environments at each site, inspections will be performed on the seal water path of the waste gas compressor. One of two possible locations at each site will be examined.

(4) For the carbon steel components exposed to a gas environment at each site, an inspection will be performed on components within the scope of license renewal located between the volume control tanks and the waste gas compressor phase separators.

For McGuire, this new inspection will be completed following issuance of renewed operating licenses for McGuire Nuclear Station and by June 12, 2021 (the end of the initial license of McGuire Unit 1). For Catawba, this new inspection will be completed following issuance of

renewed operating licenses for Catawba Nuclear Station and by December 6, 2024 (the end of the initial license of Catawba Unit 1).

The inspectors reviewed the program documentation and discussed the program with the engineering staff. The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure the aging effects will be appropriately managed. When implemented, there is reasonable assurance that the intended function of the carbon steel, stainless steel, or brass components in the waste gas system will be maintained through the period of extended operation.

18. Liquid Waste System Inspection

This is a new program being developed to perform a one-time inspection to characterize any loss of material and cracking of system components within the scope of license renewal exposed to unmonitored borated and treated water environments and raw water environments. An unmonitored borated or treated water environment is one that may contain conditions that can concentrate existing levels of contaminants and are not routinely monitored by the chemistry control program. Uncertainty exists as to whether exposure to these environments could lead to loss of material and cracking such that they may lose their pressure boundary function in the period of extended operation. This activity will inspect system components in the various environments to detect the presence and extent of any loss of material and cracking.

The liquid waste system Inspection is cast iron, stainless steel and carbon steel components exposed to unmonitored treated and borated water environments or raw water environments in the following McGuire and Catawba systems:

- component cooling system (McGuire) - the portion of the component cooling system of concern is the stainless steel waste evaporator package exposed to an unmonitored treated water environment of the liquid waste recycle system;

- liquid waste recycle system (McGuire) - stainless steel components exposed to an unmonitored borated water environment;

- liquid radwaste system (Catawba) - stainless steel components exposed to an unmonitored borated water, unmonitored treated water, or a raw water environment; carbon steel and cast iron components exposed to a raw water environment.

The liquid waste system inspection will use a volumetric technique to inspect the material/environment combinations located in each system listed above. As an alternative, visual examination will be used should access to internal surfaces become available. For McGuire, this new inspection will be completed following issuance of renewed operating licenses for McGuire Nuclear Station and by June 12, 2021 (the end of the initial license of McGuire Unit 1). For Catawba, this new inspection will be completed following issuance of renewed operating licenses for Catawba Nuclear Station and by December 6, 2024 (the end of the initial license of Catawba Unit 1).

The inspectors reviewed the program documentation and discussed the program with the engineering staff. The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had provided adequate guidance to ensure the aging effects will be appropriately

managed. When implemented, there is reasonable assurance that the intended function of the cast iron, stainless steel and carbon steel components in the systems addressed in previous paragraph will be maintained through the period of extended operation.

19. Fluid Leak Management Program

The Applicant credited the existing Fluid Leak Management Program for aging caused by leaks from systems containing boric acid. This program, however, serves to manage all types of leaks via identification, tracking and evaluations. Personnel who identify leaks by various means are required to enter the information into the tracking system and notify appropriate personnel. Other programs such as the chemistry program and service water inspections are credited for aging management for non-boric acid fluid systems. The Applicant also plans to enhance the Inspection Program for Civil Engineering Structures and Components to periodically observe for affects of aging from various leaks on mechanical components such as piping and valves as well as structures. In addition, the Applicant credited the system pressure testing process, the reactor coolant system Mode 3 walkdowns, and non-licensed operator observations for this program. The inspectors reviewed the Applicant's procedures/directives and specifications, reviewed selected proposed procedure changes, reviewed the leakage program data base, and held discussions with Applicant personnel including program owners at both sites.

In general, the program was thorough and viable. The inspectors noted, at Catawba, that a new program had been recently developed (Catawba Nuclear Site Directive 3.11.4, Site Materiel Condition) which would result in coordinated and documented observations for aging effects such as might be evidenced or caused by leaks. Therefore, this document would be an appropriate reference for the Fluid Leak Management Program.

The inspectors noted that the procedures for evaluation of boric acid effects did not clearly cover electrical components which the Applicant had credited. The inspectors also noted that the recent revision to the civil structures program (EDM-410) to incorporate mechanical components had not clearly covered acceptance criteria and personnel qualifications for mechanical components. The Applicant stated that appropriate changes would be initiated to address these observations.

The inspectors concluded that the Applicant had provided adequate guidance to assure that aging effects will be appropriately managed via the Fluid Leak Management Program. When implemented as described, there is reasonable assurance that intended functions of SSCs will be maintained through the period of extended operation, in part, via this program.

20. Boraflex Monitoring Program (McGuire Only)

The Applicant credited the existing Boraflex Monitoring Program at McGuire for aging management of the boraflex panels in the spent fuel storage racks. Catawba does not have boraflex. The program monitors areal density of the panels and also monitors silica levels in the spent fuel pool. The inspectors reviewed the Applicant's procedures, reviewed recent areal density test results, reviewed silica trends, reviewed a recent fuel pool calculation, and discussed the program with Applicant personnel.

The inspectors noted that degradation will require changes to the fuel pool racks in the future, however, when implemented as described, there is reasonable assurance that boraflex degradation will be effectively managed through the period of extended operation.

21. Divider Barrier Seal Inspection and Testing Program

The Applicant credited the existing seal inspection program and associated procedures for managing cracking and change in material properties of the divider barrier seal in each containment and other elastomer pressure seals in containment. The program provides for visual inspections of the seals and tensile testing of the divider barrier seal. The inspectors reviewed applicable procedures and recent inspection and test results.

The inspectors concluded that the Applicant had provided adequate guidance to assure that aging effects will be appropriately managed via the inspections. The program provides a reasonable assurance that intended functions of the seals will be maintained through the period of extended operation.

22. Galvanic Susceptibility Inspection

The Applicant plans to develop a one time inspection of a sample of locations where different materials are connected, concentrating on carbon steel/stainless steel combinations in raw water environments. The inspectors discussed with the responsible engineer the process by which samples and inspection techniques will be selected. The inspectors concluded that the Applicant had adequate plans to assure that aging effects due to galvanic corrosion will be appropriately managed.

23. Ice Condenser Inspections

The Applicant credited the existing ice basket inspection and ice condenser engineering inspection for managing aging of the ice condenser. The ice basket inspection consists of the Technical Specification Surveillance inspection of two baskets in each azimuthal group and basket inspections performed during refueling outages. The engineering inspection provides for a visual inspection of structural components in the upper plenum, lower plenum, and top deck blankets. The inspectors reviewed Applicant procedures and recent inspection results.

The inspectors concluded that the Applicant had provided adequate guidance to assure that aging effects of the ice condenser will be appropriately managed via the inspections. The inspections provide reasonable assurance that the intended functions of the ice condenser affected by aging will be maintained through the period of extended operation.

24. Thermal Fatigue Management Program

The Applicant plans to utilize established procedures to monitor selected transients to confirm that fatigue cycles do not exceed the maximum established by analyses for the 60 year period. The inspectors reviewed the Applicant's procedures for counting transients, reviewed engineering documents, reviewed selected results of transient cycle counting, reviewed the UFSAR, and held discussions with Applicant personnel. During the review, the inspectors noted that all documents did not agree relative to which transients to count and the allowable frequency for several transients. The Applicant stated that these problems were identified during their review and PIPs had been generated to affect corrective action. The inspectors also reviewed these PIPs. No transients were noted that were near the allowable frequency.

The inspectors concluded that the Applicant had provided adequate guidance to assure that aging effects will be appropriately managed via the thermal fatigue management program. When implemented as described, there is reasonable assurance that the intended functions of

systems and components relative to fatigue monitoring will be maintained through the period of extended operation.

25. Reactor Coolant System (NC) Operational Leakage Monitoring Program

The Applicant credited the established program for detecting operational leakage in accordance with Technical Specifications as a second line of defense against aging effects that may result in leakage such as cracking or loss of mechanical closure. Leakage is monitored by a periodic leakage calculation as well as measurement of Containment floor and equipment sump level, measurement of condensate drain tank level change, and radioactivity monitoring of containment and secondary systems. The inspectors reviewed Applicant procedures, engineering guidance, and recent leakage calculation results.

The inspectors concluded that the NC Operational Leakage Monitoring Program contains adequate guidance to provide an additional line of defense for aging caused leakage. The program will provide additional assurance that the NC will remain functional during the period of extended operation.

26. Service Water Piping Corrosion Program

The Applicant credited the existing Service Water Piping Corrosion Program for managing loss of material in raw water systems. The program is credited for components in the Containment Ventilation Cooling System, Exterior and Interior Fire Protection Systems, Nuclear Service Water System (RN), and heat exchanger sub-components in the Containment Spray System, Control Area Chilled Water System, and Diesel Generator Systems. Sample points have been selected for ultrasonic testing in the RN system with various flow regimes. Corrosion rates are trended for predictions of degradation. Additional stress analysis has been performed in some cases to refine acceptance criteria and extend the life of some piping sections. In addition, methods such as walkdowns, operator rounds, system testing, and maintenance activities serve to identify through wall leaks. The Applicant plans to trend these leaks. The Applicant also plans to remove an approximately 20-foot degraded portion of Unit 1, train A underground RN piping at Catawba for evaluation. The RN system was considered the worst case indicator for degradation. The Catawba station has been susceptible to general corrosion and microbiologically-influenced corrosion (MIC) due to raw lake water chemistry. The Applicant plans to add sample points in the fire protection system at Catawba. Historically, Catawba experienced significant fouling in non-safety related systems and in the supply to the Auxiliary Feedwater System (AFW), discovered by observations of decreased flows. Additional management was applied to raw water systems via a special project. This resulted in cleaning of safety related portions of RN and replacement of non-safety related piping and selected safety related piping including the AFW. This project is ongoing. The inspectors reviewed associated engineering documents, reviewed procedures, reviewed ultrasonic test data basis, and held discussions with responsible engineering personnel.

The inspectors concluded that the Applicant had provided adequate guidance to assure that loss of material in raw water systems will be adequately managed via the Service Water Piping Corrosion Program. The existing program with enhancements will provide reasonable assurance that the intended functions of the systems will be maintained through the period of extended operation.

27. Standby Nuclear Service Water Pond Dam Inspection

The Applicant credited the existing Standby Nuclear Service Water Pond Dam Inspection Program performed in accordance with site Technical Specifications for management of cracking and loss of material. The inspection includes the upstream and downstream slopes, the spillway overflow/outlet, the right and left abutments, and the toe of the dam. The program requires visual examination for erosion, settlement, slope stability, seepage, drainage system condition, integrity of rip-rap, and environmental conditions. In addition, the Applicant performs piezometric readings and settlement monitoring via surveys. Piezometer readings are trended. The inspectors reviewed applicable procedures and recent inspection results.

The inspectors concluded that the Applicant had provided adequate guidance to assure that aging effects of the dams will be appropriately managed. The program provides reasonable assurance that intended functions of the dams will be maintained through the period of extended operation.

28. Standby Nuclear Service Water Pond Volume Program (Catawba only)

The Applicant has determined that the existing program for managing sedimentation is appropriate to credit for the RN pond at Catawba only. The program consists of a topographic survey of the pond at least every five years. Calculations of pond volume are performed based on the survey. The inspectors reviewed the applicable procedure and recent survey results.

The inspectors concluded that the Applicant had provided adequate guidance to assure the sedimentation aging effects will be appropriately managed via the inspections. The program provides reasonable assurance that the intended function of the RN pond will be maintained relative to sedimentation through the period of extended operation.

29. Pressurizer Spray Head Examination

Based on an NRC Request for Additional Information No. 2.3.2.7 in a letter dated January 23, 2002; the Applicant indicated that a one time examination of the pressurizer spray head would be performed. The Applicant plans to inspect the unit with the most hours of operation. Details of this examination are yet to be developed. The inspectors held discussions with responsible engineering personnel concerning the intended planning for the examination and reviewed the Applicant's Oconee Station implementation tracking document for a similarly planned examination. The inspectors concluded that the Applicant appears to have adequate planning initiated to assure the inspection will be performed.

B. Review of Electrical Equipment Aging Management Programs

1. Non - EQ Insulated Cables and Connections Aging Management Program

This is a new AMP that is yet to be developed. The Environmental Qualification (EQ) program is a well established program to ensure that electrical components, such as cables, that may be subject to a harsh environment are properly constructed to perform their intended function even when subject to that harsh environment. This new program will perform periodic visual inspections of accessible, i.e. able to be approached and viewed easily, non-EQ cables which are in the scope of license renewal. The inspections will look for cable and connection jacket surface anomalies such as embrittlement, discoloration, cracking, or surface contamination. Such jacket surface anomalies are precursors of insulation aging degradation and may indicate

adverse localized equipment environments caused by heat or radiation which can accelerate aging of electrical cables. These visual inspections are to be performed at least once every ten years. The initial inspections are to be performed following the issuance of the renewed operating licenses and prior to the end of the current operating license for Unit 1 at each site. The Applicant had yet to develop inspection procedures for this AMP.

2. Inaccessible Non-EQ Medium Voltage Cables Aging Management Program

This is also a new AMP that is yet to be developed. The purpose of the AMP is to perform a test on inaccessible, e.g. in conduit or direct buried, non-EQ medium voltage cables that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as exposure to long term, such as a few years, continuous standing water. Significant voltage is defined as being energized for more than twenty-five percent of the time. The cables are to be periodically tested to provide an indication of the condition of the conductor insulation and the ability of the cable to perform its intended function. The actual type of test has yet to be determined. The initial tests are to be performed following the issuance of the renewed operating licenses and prior to the end of the current operating license for unit 1 at each site. The tests will be repeated with a 10 year frequency. The Applicant had yet to develop inspection procedures for this AMP.

3. Applicant Response to Station Blackout Issue

On April 1, 2002 NRC issued a memo to the industry informing them of the NRC staff position on the license renewal rule 10 CFR 54.4 as it relates to the Station Blackout (SBO) rule 10 CFR 50.63. The position holds that the plant system portion of the offsite power system that is used to connect the plant to the off site power source should be included in the scope of license renewal. This is necessary because this is the power path that would be used to recover from a SBO. The Applicant is aware of the position and has agreed to adjust their programs to address the position. For McGuire and Catawba this resulted in adding components as subject to aging management review. Isolated-phase bus installed to connect the unit generator to the Unit Main Power System and nonsegregated-phase bus installed to connect the auxiliary power transformers to the Normal Auxiliary Power Systems are now in scope. Passive switchyard commodities such as transmission conductors, switchyard bus, and high voltage insulators are also in scope. The Applicant performed an aging management review on the additional components and concluded that they will perform their function during the period of extended operation and that no additional aging managemnt programs are needed for these components.

At both McGuire and Catawba inspectors reviewed plant drawings with Applicant engineers to understand what additional electrical equipment will be brought into scope. The inspectors examined accessible portions of the additional equipment with Applicant engineers and found it in acceptable condition.

C. Review of Structural Aging Management Programs

1. Containment Inservice Inspection Plan -IWE

The Containment Inservice Inspection Plan - IWE is generally applicable to both the McGuire and the Catawba Nuclear Stations, except as otherwise noted.

The inspection plan for McGuire, MC-1042-CISI-0001, “McGuire Nuclear Station 1&2 First Interval Containment Inservice Inspection Plan”, Revision 2, 8/27/01 and for Catawba, CN-

1042-CISI-0001, “Catawba Nuclear Station Containment Inservice Inspection Plan”, Revision 3, 6/5/01 are generally developed to implement applicable requirements of 10 CFR 50.55a and cover both IWE and IWF examinations. There are several relief requests submitted by Duke and approved by the NRC. These relief requests are 98-GO-001, “Request for relief from performing visual, VT-3 examinations on seals and gaskets;” 98-GO-002, “Request for relief from performing bolt torque or tension test for pressure retaining bolting;” 98-GO-003, “Request for alternative to the visual, VT-1 and volumetric examination requirements for areas subject to augmented examination,” 98-GO-007, “Request for alternative to the ultrasonic thickness measurement requirement of IWE-2500(c)(4);” and 00-GO-001, “Request for alternative to the VT-2 examination requirements of IWE-5240.” The inspectors reviewed the inspection plans, relief requests and approving SERs and found them satisfactory.

The inspectors reviewed the most recent McGuire containment inservice inspection results. The inspections were performed for Unit 1 in 1999 and Unit 2 in 2002. In general, the inspections found the containment structures acceptable. Enclosure 13.3 of PT/1/A/4200/044, “Procedure Process Record for Containment Structural Integrity Inspection of MNS Unit 1,” Revision 1, 2/15/99 indicated that in many places the moisture barriers were removed or are going to be removed and cited that, in many places, the barriers are not needed. However, in other places, the degraded moisture barriers were replaced or are going to be replaced. The inspectors asked the Applicant why barriers are needed in some places and not others. The Applicant replied that some of the moisture barriers were not required per design. During construction, cork was placed between the steel containment and the concrete floors as expansion spaces. Moisture barriers/sealing material was applied to prevent moisture intrusion. In most the places, there was no trace of moisture at the time of inspection, therefore, the moisture barriers are not necessary. The only places that moisture barriers are needed are the containment wall and mat junction and near the fuel transfer canal. When the moisture barrier/sealing material degraded, they cracked, shrunk, and separated from the containment. In the process of separation, they took the containment coating with them and left the steel containment bare with primer. The cork absorbed moisture when moisture was present and caused the steel containment to rust. Problem Investigation Process (PIPs) C-95-01464 and C-98-03567 documented this fact. The Applicant decided to remove the moisture barrier/sealing material where it is not needed to prevent further damage to the steel containment. The inspectors agreed with this approach.

During review of the Catawba containment inservice inspection records, the NRC inspectors noted some very low thickness readings in the UT data, especially for Catawba Unit 2 (2EOC11 - Containment ISI Record, File #CN-1144.09, Record #005687). The IWE Code has a 10 percent below nominal allowance but Record #005678 contains many thickness readings lower than the 10 percent allowable. The nominal thickness of the free standing steel containment is 0.75 inches and the lowest reading is 0.623 which is only 83.1% of the nominal thickness. Inspection records showed that these readings were discovered during the 2EOC10 containment ISI. A PIP had been issued to investigate this concern.

PIP C-00-01555 was issued on 3/27/00 and indicated that 9 points had readings less than 90% of the nominal thickness ranging from 89.7% to 83.1%. In according to IWE-3512.3, the Applicant performed an engineering evaluation which declared these low readings acceptable. The reason is that the low readings were all in the vicinity of welds and they were not caused by degradation, rather by field grinding in preparation for field welding. Section 2.2.7 of Specification No. CNS-1144.11-00-0001, “Specification for Field Welding and Erection Tolerances of Containment Vessel,” Revision 7, 2/28/83 indicates that for 0.75 inch thick cylindrical plate the acceptable minimum thickness could be as low as 0.650 inches. Even

though the two lowest readings of 0.623" and 0.640" are lower than the 0.650" allowed by the field welding specification, PIP C-00-01555 concluded: “Because the 2 thinnest readings of 0.623" and 0.640" are not significantly less than the allowable 0.650" thickness, it is not warranted to perform a detailed calculation to confirm the acceptability of these locally thin areas.” The PIP further states: “The condition of the containment vessel is considered acceptable. In accordance with IWE-3122.4, these UT readings are not considered to be indicative of degradation, and the conditions are considered non-structural and have no adverse affect on the structural integrity of the containment. All areas examined during 2EOC10 are scheduled to be examined in accordance with IWE-2420(b) and (c), as required by IWE 3122.4(b).” The 2EOC11 UT record showed the exact same readings at the two thinnest places to confirm the PIP’s conclusion. The inspectors agreed with this conclusion.

2. Containment Leak Rate Testing Program

The Duke Containment Leak Rate Testing Program, as described in Section 4.26 of Appendix B of the LRA and Section 5.52 of the Technical Specifications (TS), is established to fulfill the 10 CFR 50, Appendix J, Option B, Type A testing requirements. Section 5.5.2 of the TS also specifies the maximum allowable containment leakage rate, L_a, to be 0.3% of containment air weight per day. The acceptance criteria, as specified in Section 5.5.2.a of the TS, is less than $0.75L_a$. As stated in the Containment Inservice Inspection Plan - IWE section of this report, the Applicant has requested relief from performing certain inservice inspections and to use the containment leak rate test to verify the integrity of seals and gaskets of Class MC pressure retaining components and CC components (98-G-001), to verify the pressure retaining bolting of Class MC pressure retaining components and Class CC components (98-GO-002), and to satisfy the requirements of IWE-5221 following repairs, replacements, or modifications (00-GO-001). Therefore, the containment ILRTs will assure not only the containment satisfies the Appendix J requirements but also provide confirmation that these reliefs are validated.

Duke document PT/1/A/4200/001 A, “Containment Integrated Leak Rate Test,” Revision 19, 11/9/00 lists the step by step procedure to perform the ILRT. The inspectors reviewed the results of the last ILRT of both plants and found they are all within the allowable. The McGuire ILRT shows that Unit 1 was 0.1482 wt%/day and Unit 2 was 0.1469 wt%/day. Catawba unit 1 was 0.0965 wt%/day and Catawba Unit 2 was 0.0906 wt%/day. They are all well below the acceptance criteria of 0.225 wt%/day (0.75 x 0.3 wt%/day). The inspectors concluded that the McGuire and Catawba ILRT demonstrated that the containments of all four units are in good operable condition.

3. Flood Barrier Inspection (McGuire)

The flood barrier inspection program is plant specific and is for McGuire only. This program uses a model work order, WO 93045301. The flood barriers to be inspected are internal flood barriers. They are:

a. Doorway curbs around rooms 500, 501, 502, and 503 for deterioration and damage. Initiate repair if necessary. Curbs are shown on Drawing (DWG) MC-1221-01.

b. Curbs at diesel generator room entrance doors at EL 739' for deterioration and damage. Curbs are shown on DWG MC-1170-01.

c. Sealed walls and penetrations between Auxiliary Building and Interior and Exterior Doghouses at or below EL 755' - 3".

d. Electrical and mechanical piping sleeves to ensure penetrations would give adequate flood protection. Penetrations are shown on DWGs MC-1220-215 and MC-1220-147.

e. Expansion joint along floor at Reactor Building wall for proper flood protection.

f. Sealed wall penetrations along column line AA on Els 733' and 750' from column line 40 to column line 56.

g. Electrical/Mechanical pipe sleeves, cable tray openings, personnel access openings, pipe trenches, and equipment/personnel access openings for adequate flood protection, initiate repair W/R if necessary. Penetrations are shown on DWGs MC-1220-97 and MC-1220-98.

The inspectors reviewed McGuire Drawings MC-1220-97, "Auxiliary Building - Units 1&2 Flood Protection Wall Elevation," Revision 14, 2/22/02 and MC-1220-98, "Auxiliary Building - Units 1&2 Flood Protection Penetration Schedule & Details," Revision 20, 4/30/02 which depict the locations of flood protection barriers listed in Item g. above.

The inspectors also reviewed WO 98208190 which reported the results of the April, 2000 flood barrier inspection of McGuire Unit 1. Only three minor observances were found and work requests (W/R) were generated to have them corrected or repaired. W/R 98124570 was generated to caulk the leak around door PD-3; W/R 98124574 was generated to tighten door 801E against the seal to form a flood tight barrier; and W/R 98124557 was generated to repair the torn boots around penetrations 40 & 42. All other flood barriers inspected were in good condition. The inspectors agreed with the Applicant's assessment.

4. Inspection Program for Civil Engineering Structures and Components

Engineering Directives Manual, EDM - 410, "Inspection Program for Civil Engineering Structures and Components," Revision 8, 2/27/02 specifies the purpose of the document is to provide a program for monitoring and assessing civil engineering structures and components and their condition in order to provide assurance that they are capable of performing their intended functions. The scope of the program includes all structures and components that are within both the license renewal and maintenance rules. Table 410-2 lists all structures subjected to the structural inspection program for both McGuire and Catawba Nuclear Stations. Section 410.4.7 lists the qualifications of inspectors and evaluators and Section 410.4.8 lists the inspection frequency to be every 5 years.

The inspectors reviewed the reports of the most recent civil structural inspection performed for McGuire and Catawba and found that, even though the steel containment and the reactor building shell are not covered by this program, the Duke inspector did performed visual inspection on them, as part of their respective inspections. The steel containment is under the ISI IWE inspection and the reactor building shell is under the Technical Specification SR 3.6.16.3 visual inspection programs.

The McGuire civil structural inspection was performed in 1997 and documented in File No. MC-1462.00, "McGuire Nuclear Station Units 1&2 1997 Inspection report for Civil Engineering

Structures and Components per EDM -410," 2/15/98. Section 2 of the report concludes that the structures and components are capable of performing their intended function, including the protection or support of nuclear safety-related systems or components. The report further concludes that several degraded conditions were minor and do not affect the integrity of the subject structure. All findings have been addressed via PIPs or by station W/Rs. Table 1 of the report documents the structures and components that are inspected. Table 2 of the report lists all the findings of that inspection. All findings are classified as acceptable, however, PIPs and W/Rs were issued to address the findings and Attachment II of the report lists the appropriate resolutions.

At McGuire the inspectors walked down the intake structure which houses the non-safety related CCW pumps and the fire protection pumps. The CCW pumps are located in open air on the upper level while the fire protection pumps are housed in the lower cubicles. The inspectors also walked down the Nuclear Service water Pond Dam. The inspectors agreed with the Applicant's assessment from the 1997 inspection report.

The Catawba Nuclear Station, Units 1&2 were inspected between March 1997 and October 1998 and the results were documented in File No. CN-1642.00, "Catawba Nuclear Station, Units 1&2 1997-1998 Inspection of Civil Engineering Structures and Components, "10/13/98. The summary report was issued 10/26/98 to list all recommendations to change the frequencies of certain inspections to less than the normal frequency of five years.

The inspection revealed some bare spots inside the containment and issued work order (WO) 98023443 to repair them. The inspection also found trench covers were damaged or crushed and WOs. 98044583 and 98046481 were issued to repair them. Based on the degree of damage to the concrete covers, the Duke inspector recommended that the frequency to inspect the trench covers should be every two years rather than the normal frequency of every five years.

At Catawba the inspectors walked down the Low Pressure Intake Structure where the fire pumps are located. The intake structure also houses the CCW (non-safety) pumps. The inspectors visually inspected both the upper and lower level of the structure and found that the structure itself is in good condition, however, there are some pipes that are in bad rusted conditions. The inspectors also walked down the safety-related Nuclear Service Water Pump House and found the above water portion of the trash rack and the structure is in good condition. The Applicant informed the inspectors that the underwater inspection covers the underwater portion of the trash racks and the structures.

5. Underwater Inspection of Nuclear Service Water Structures

The underwater inspection of nuclear service water structures for both McGuire and Catawba is contained in a model work order 95065949, "PM-Underwater Inspection of Raw Water Structures," 8/22/95. The WO lists all steps necessary to perform the inspection.

The latest McGuire inspection was performed in June, 1999 by Eason Diving & Marine Contractors, Inc. of Charleston, SC. The inspection covers the Low Level Intake Structure, the Standby Nuclear Service Water (SNSW) Intake Structure, the SNSW Discharge Structure, the CCW Intake Structure Wing Wall and Units 1&2 Discharge Structure as described in a letter from the contractor dated 6/18/99. In the letter, the contractor describes that there was no discrepancies found in all the underwater structures inspected, except some silt deposits. The inspectors also reviewed reports from previous underwater inspections, by the same contractor,

and found there was a trash rack replaced for the Standby Nuclear Service Water Pond Intake Structure (WO 93033689) in 1993.

The latest Catawba underwater structure inspection was performed in April 2002 by Eason Diving and Marine Construction, Inc. of Charleston, SC. The inspection covers the Nuclear Service Water (NSW) Pond Intake Structure "B" train, NSW Overflow Structure (Inlet and Outlet), NSW Lake Intake Structure, NSW Pump and Valve Room "B" train, NSW Dam, and Short and Long Leg Discharge Structure to NSW Pond. The inspection report, written and submitted to Duke on May 10, 2002 did not find any deficiencies. The only findings were some silt deposit and several of the stainless trash rack anchor bolts were loose but still performing their intended function. The inspectors agreed that the underwater part of the structures, both McGuire and Catawba, are in good condition.

6. Technical Specification SR 3.6.16.3 Visual Inspection

The surveillance requirements of Section SR 3.6.16.3 of the Technical Specification (TS) of both McGuire and Catawba states "Verify reactor building structural integrity by performing a visual inspection of the exposed interior and exterior surfaces of the reactor building." Along with the Civil Engineering Structures and Components Inspection, this is the inspection to assure the operability of the reactor building. The frequency of this inspection is three times every 10 years, coinciding with the containment inservice inspection plan frequency.

Duke document PT/2/A/4200/078, "Containment Structural Integrity Inspection", for Catawba Unit 2 specifies that the purpose of the inspection is "to verify by general visual inspection the structural integrity of the steel containment vessel and reactor shield building in accordance with 10CFR50, Appendix J, ..." The 1998 inspection was documented in PT/2/A/4200/078, and page 19 of Enclosure 13.3 indicated four abnormalities (hair line crack on the exterior surface of the reactor building, minor rust staining on top of the parapet wall, etc.), but all were considered acceptable.

PT/2/A/4200/044 documents the 2000 McGuire Unit 2 Structural Integrity Inspection results. Pages 36 - 45 of Enclosure 13.3 documents the inspection findings of the reactor shield building during the 1999-2000 inspection. On page 36, the document indicates that brown staining was seen at ceiling expansion joints on the exterior wall. The inspector decided they were old stains and were not active at the time of the inspection. The condition is acceptable. Acceptable minor degradations were also documented on Pages 37, 40, 41, 42,, 43, 44, 45.

Enclosure 13.3 of PT/1/A/4200/044 documented the results of the Structural Integrity Inspection of McGuire Unit 1. Pages 34 & 35 of the Enclosure indicated that leaching was observed in several places on the exterior surface of the Unit 1 Reactor Shield Building and the Duke inspector determined that the conditions were acceptable.

The McGuire Units 1&2 reactor building was visually inspected during the 1997 Civil Engineering Structures and Components Inspection. The final report, entitled, "McGuire Nuclear Station Units 1&2 1997 Inspection Report for Civil Engineering Structures and Components Per EDM-410 'Maintenance Rule Program'" was issued on 2/15/98. Attachment #1 of the report lists the building parts that were inspected. Section 1 of Attachment #1 documents the exterior surface of the reactor building shield wall, Section 2 documents the containment vessel exterior and the reactor building shield wall interior, and Section 3 documents the containment vessel interior. Attachment II lists all the findings for each section. For section 1, the reactor building exterior, most findings are minor and need no actions. In

area 1.8 - reactor building dome, work order (WO) 97012413 was generated to repair coating/sealants in a parapet area. The inspectors concluded, in the report cover letter, dated 2/15/98, that none of the findings were judged to adversely affect structural integrity and were classified as acceptable findings.

The 1997-1998 Catawba Inspection of Civil Engineering Structures and Components also included visual inspections of the reactor buildings of both units. As documented in File No. CN-1462.00, dated 10/13/98, Section 7.1 discusses the reactor building inspection but only addressed the results of the reactor building internals. The reactor building shield walls were not addressed. However, the inspector made some recommendations to change the frequencies to monitor certain structures documented in a memorandum dated 10/26/98. The memorandum also concluded that all the findings were considered to be acceptable. The NRC inspectors agreed with these conclusions.

7. Crane Inspection Program

The Applicant plans to utilize the existing crane inspection program with modifications. The program is intended to manage loss of material, which has been identified as an aging effect for crane rails and girders during the period of extended operation. The program detects aging effects through visual examination of the crane rails and girders. Inspection procedures for cranes and hoists are identified in plant procedures and are in accordance with industry standards, plant experience, and other industry experience. Each crane and hoist is subject to several inspections. Prior to initial use, all new, reinstalled, altered, modified, extensively repaired, and newly erected cranes are inspected and the results of the inspections are documented. Additional inspections are conducted prior to crane operation, quarterly, and/or annually depending on the specific crane or hoist. The inspection frequencies for the cranes and hoists are based on the guidance provided by ANSI B30.2.0 and ANSI B30.16. The inspectors reviewed the License Renewal Application, Appendix B, which described program requirements, associated procedures, engineering documents, and recent evaluation results. In addition, the inspectors held discussions with site and corporate program owners in this area and walked down the fuel handling and spent fuel pool cranes to assess existing conditions.

The inspectors concluded that the Applicant had conducted adequate historic reviews of plant specific and industry experience information to determine aging effects. The Applicant had established tracking items to assure implementation of proposed actions to support license renewal and some procedures already had modifications outlined. In addition, the inspectors concluded that the Applicant had provided adequate guidance to ensure that the aging effects will be appropriately managed. When implemented as described, there is reasonable assurance that the intended functions of the polar, fuel handling, and spent fuel pool cranes will be maintained through the period of extended operation.

D. Fire Protection

During the previous Scoping and Screening inspection the inspectors observed that the license renewal and plant design basis documents for McGuire and Catawba had differing, conflicting, and sometimes vague definitions of the QA Condition 3 fire protection (FP) program, and the basis for license renewal scoping of FP equipment was not clear. Therefore the inspectors were unable to confirm that scoping and screening for FP systems and components had been performed successfully in accordance with 10 CFR 54.4(a)(3). A number of RAIs had been issued from NRR to Duke to resolve concerns pertaining to how much of the plant fire protection equipment should be in scope for license renewal. As of the date of this inspection

the Applicant was still in disagreement with the NRR staff over how much of the plant fire protection equipment should be in scope of license renewal.

During this inspection inspectors reviewed the past results of tests on fire protection equipment. The LRA credits the Fire Protection Program to manage loss of material and fouling of fire protection equipment such as sprinklers, fire hydrant piping loops and valves, and hose rack valves. The Fire Protection Program credits existing plant surveillance procedures required by Selected licensee Commitments (SLC) involving visual inspections to verify sprinkler condition and performing flow tests and flushes of the system to verify that blockage of flow will not prevent system function.

At McGuire inspectors reviewed the records of the following completed tests.

PT/1/A/4700/42 Tech Spec Fire Hose Station Valve Operability Test completed 3/3-4/01.
PT/2/A/4700/43 SLC Fire Hose Station Valve Operability Test completed 12/22-23/00.
MP/0/B/7700/051 Reactor Building Fire Hose Station Inspection completed for unit 2 3/12/02.
PT/0/A/4400/001E Fire Hydrant Operability Test and System Flush completed 2/8/02.
PT/2/A/4400/001L Fire Protection Containment Header Test completed 4/9/01.
PT/0/A/4400/001T Fire Protection System Auxiliary Building Flush and Flow Test completed 4/2/02.

At Catawba inspectors reviewed the records of the following completed tests.

PT/0/A/4400/001E Fire Hydrant Operability Test completed 7/1/02.
PT/0/A/4400/01S RY Fire Protection Flow Periodic Test completed 8/11/97.
PT/0/A/4400/001X Essential Area Sprinkler Alarm System Test completed 6/19/02.
PT/0/A/4400/01J Spray Valve Sprinkler System Periodic Test portions completed 10/16/01 and 5/11/02.
PT/0/A/4400/01W Valve Operability and Water Availability Visual Inspection completed 8/16/00.

The records reviewed appeared acceptable. At Catawba, the inspectors noted that the RY Fire Protection Flow Periodic Test had exceeded its three year test frequency. Applicant engineers explained that the test could not be completed when last attempted in April 2001 due to a buried valve that would not completely close. The inspectors reviewed two PIPs, C-01-01612 and C-01-01954 which documented the problem. The temporary solution has been to tag the valve open, its normal position, and declare the fire protection system Operable But Degraded until the valve can be repaired.

At Catawba, the inspectors noted that the test results from the Valve Operability and Water Availability Visual Inspection contained numerous entries remarking on dirty water and debris coming out of hose stations during flushes. Applicant engineers explained that fire water comes directly from the lake and contains much silt and debris so it is a continual challenge to keep the system flushed.

A second part of the fire protection AMP is the Fire Barrier Inspections program which credits existing plant surveillance procedures. Those procedures are required by SLC 16.9.5 and periodically require visual inspection of fire barriers to detect loss of material due to corrosion of fire doors, cracking of fire walls, and cracking/delamination and separation of fire barrier penetration seals. The inspectors reviewed records of recent performance of the surveillance procedures to determine success of the program.

At McGuire inspectors reviewed the following records.

PT/0/A/4250/004 Periodic Inspection of Fire Barriers
Fire Barrier Penetrations Seal Inspection Checklist unit 2 completed 1/7-21/02
Fire Barrier Penetrations Seal Inspection Checklist unit 1 completed 10/8-11/6/01
Fire Door Inspection completed 3/26-4/8/02

The records reviewed appeared acceptable. Subsequently during this inspection, inspectors learned that the Applicant discovered at McGuire on 7/15/02 that a portion of this PT had apparently not been performed since 1990. PIP number M-02-03466 was initiated by the Applicant. It states that in 1990 one large surveillance was changed to be implemented by several model work orders but no model work order was created for the portion that requires a visual inspection of the exposed surfaces of each required fire rated assembly on a 18 month frequency, thus the inspection was not being performed.

At Catawba on 7/17/2002, the Applicant discovered that workers were not completing procedure documentation for fire door inspections and fire boundary inspections. The inspectors reviewed PIP number C-02-03943 which documented the problem. The inspectors were shown computerized work order records for performance of portions of test PT/0/A/4200/048 Periodic Inspection of Fire Barriers and Related Structures. The work orders indicated that portions of the test were performed 7/19/01, 9/13/01, 12/12/01, and 3/5/02. The inspectors agreed with the PIP which states that the tests were being done by Applicant staff but were not being documented as required on the PT forms.

The inspectors concluded that the Applicant was implementing periodic surveillances for fire protection equipment. However there have been instances of failure to perform tests and failure to properly document tests.

E. Visual Observations of Plant Equipment

During the inspection, the inspectors performed walkdown inspections of plant systems, structures, and components (SSCs), and electrical cable to observe material condition and inspect for aging conditions that might not previously have been recognized and addressed in the LRA. Portions of the following systems and structures were included:

McGuire and Catawba

Component Cooling (KC)	Main Steam (SM) including PORVs and Safeties
Feedwater (CF)	Auxiliary Feedwater (CA)
Main Steam Auxiliary Equipment (SA)	Steam Generator Blowdown (BB)
Fuel Pit Cooling (FC)	Turbine Exhaust (TE)
Feedwater Turbine Hydraulic Oil (LP)	Spent Fuel Cooling (KF)
Main Steam Vent to Atmosphere (SV)	Feedwater Turbine Lube Oil (LF)
Containment Spray System (NS)	Chemical & Volume Control System (NV)
Nuclear Service Water System (RN)	Recirculated Cooling Water (KR)
Residual Heat Removal System (ND)	Safety Injection System (NI)

Standby Nuclear Service Water Pond Dam
Service Water Intake Structures

In addition, during recent refueling outages, NRC inspectors performed visual inspections of equipment inside the McGuire Unit 2 and Catawba Unit 1 containments to assess material

condition and inspect for aging mechanisms that might not have been accounted for in the LRA. The inspection details for McGuire Unit 2 are documented in NRC Inspection Report 50-369,370/2002-05. On May 7, 2002, during the Catawba Unit 1 refueling outage, an inspector performed walkdown inspections of accessible portions of plant systems, components, structures and electrical cable inside of containment. Material condition of equipment and structures inside of Unit 1 Containment was generally good and no aging mechanisms were identified that were not accounted for the in Applicant's License Renewal Program. The inspector noted a minor buildup of boric acid residue and rust on some cable armor which was followed up by the licensee and corrected. The following is a partial list of Catawba Unit 1 components and structures observed:

Cold Leg Accumulators, valves, and piping
Safety Injection lines and valves
AFW lines and penetrations
Reactor Coolant pumps base and supports
RC loop stop valves and check valves
Main Steam lines
Main Feedwater lines
Inner containment liner and coatings
biological wall structure
top of Pressurizer
Pressurizer spray valve piping
RCP seal piping

The observations of general material conditions included: inspection of piping components for evidence of leaks or corrosion, inspection of coatings (piping, tanks, and structural components), and inspection of electrical cable for indications of deterioration.

In general, the material condition at McGuire and Catawba was very good and no aging management issues were identified. Coatings were in good condition and only a few minor leaks were noted. In general, the minor leaks were captured in the Leak Management Program. At McGuire, inspectors observed one leak on a containment spray pump that was not included in the Leak Management Program. Engineers promptly initiated a work request to address the issue. The inspectors did note the following material conditions that were in contrast to the very good overall conditions:

The coatings on KC System supply and return piping to the McGuire Units 1 and 2 train B RHR heat exchangers had deteriorated due to condensation. This deterioration of coatings and continuous condensation had resulted in areas of surface rust. The condition appeared to be superficial and thus was not considered to be an operability concern. However, the condition was in contrast to the good condition of the remainder of the KC System piping in the McGuire and Catawba Units.

Poor housekeeping conditions were noted on the bottom floors of the Catawba Units 1 and 2 interior Main Steam Doghouses.

During the tour of the lower levels of the RN pump house at Catawba, some external corrosion was observed on RN piping which exceeded that observed in other portions of the plant. Corrosion areas were observed which exhibited flaking and some depth. These corrosion areas were aggravated by an improperly routed pump seal leakoff line which resulted in water constantly splashing onto the piping. During the inspection, the Applicant cleaned the worst

areas observed and conducted ultrasonic wall thickness measurements. In each case the wall thickness was well above design minimum thickness. Further review of plant records disclosed that the Applicant had identified the same condition as "potentially significant corrosion" in December, 1998 on a PIP No. C-98-04719. Also, in August, 2000; the Applicant had identified a pump leak that was causing corrosion that needed to be corrected (PIP No. C-00-04315). The Applicant stated that past corrective actions did not meet management expectations in that these problems had not been appropriately pursued in a timely manner.

At McGuire, the inspectors walked down the portion of the Recirculated Cooling Water System which had been inadvertently left out of scope as described in NRC Inspection Report 50-369, 370/2002-005. The inspectors confirmed that the appropriate portion of this system had been added to the LR scope and the application had been updated via letter dated June 25, 2002.

F. Future Implementation of License Renewal Commitments

During the inspection the Applicant made a presentation to the inspectors describing the plans for future implementation of procedure changes and other license renewal commitments. The Applicant provided draft specifications MCS-1274.00-00-0016, McGuire License Renewal Commitments, Revision 0 and CNS-1274.00-00-0016, Catawba License Renewal Commitments, Revision 0 which are the documents controlling the implementation process. In addition, completed or partially completed implementation packages for a number of Aging Management Programs were provided for the inspectors review. Based on review of these documents and discussions with Applicant personnel, the inspectors concluded that the Applicant has a good implementation plan that, if completed as described, should ensure proper implementation of license renewal commitments.

III. Conclusions

The inspection concluded that the existing aging management programs are generally being conducted as described in the License Renewal Application and that plans for new aging management programs appear acceptable to manage plant aging.

The inspection concluded that the material condition of both the McGuire and Catawba plant is very good with minor exceptions observed in isolated areas.

Exit Meeting Summary

The results of this inspection were discussed on July 26, 2002 with members of the Applicant's staff in an exit meeting open for public observation at the Duke Energy Corporation offices. The Applicant acknowledged the findings presented and presented no dissenting comments. During the exit meeting the inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. Applicant representatives replied that no proprietary material was reviewed during the inspection.

ATTACHMENT 1
SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Applicant

S. Chu, License Renewal Engineer
T. Cox, License Renewal Engineer
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R. Nader, License Renewal Engineer
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M. Semmler, License Renewal Engineer
T. Shiel, Duke Public Relations

NRC

R. Franovich, Licensing Project Manager, NRR
L. Reyes, Regional Administrator, RII
D. Roberts, Senior Resident Inspector, Catawba
S. Shaeffer, Senior Resident Inspector, McGuire
R. Taylor, Reactor Inspector

LIST OF DOCUMENTS REVIEWED

General License Renewal Documents

Application To Review the Operating Licenses for McGuire Nuclear Station Units 1 and 2 and Catawba Nuclear station Units 1 and 2

McGuire Nuclear Station Updated Final Safety Analysis Report, Revision 13

Catawba Nuclear Station Updated Final Safety Analysis Report, Revision 8

Safety Evaluation Report Related to the License Renewal of Oconee Nuclear Station Units 1,2, &3, NUREG 1723, March 2000

DPS, CNS, MCS-1274.00-00-005, License Renewal Aging Management Programs and Activities, Revision 0

MCS-1274.00-00-0007, Structures and Structural Components Screening and Aging Management Review for License Renewal, Revision 1

CNS-1274.00-00-0007, Structures and Structural Components Screening and Aging Management Review for License Renewal, Revision 1

MCS-1274.00-00-0016, McGuire License Renewal Commitments, Revision 0

CNS-1274.00-00-0016, Catawba License Renewal Commitments, Revision 0

Existing Plant Procedures and Programs

General

Catawba Technical Specification Units 1&2, Amendment 189/182

McGuire Technical Specification Units 1&2, Amendment 184/166

Inservice Inspection

Third Interval Inservice Inspection Plan McGuire Nuclear Station Unit 1 - General Requirements and Volume 1, Revision 0

Second Interval Inservice Inspection Plan McGuire Nuclear Station Units 1 & 2 - General Requirements and Volume 1, Revision 3

Catawba Nuclear Station Second Ten-Year Interval Inservice Inspection Plan

Inservice Inspection Pressure Test Plan - McGuire Nuclear Station Unit 1 - Third Inspection Interval

QAL-15, Inservice Inspection (ISI) Visual Examination, VT-2, Pressure Test, Revision 19

McGuire MP/0/A/7650/076, Controlling Procedure for System Pressure Testing of ASME Piping Systems

Catawba Inservice Inspection Pressure Test Plan, Revision 3

Catawba MP/0/A/7650/088, Controlling Procedure for Systems Pressure Testing of ASME Section XI Duke Class A, B, and C Systems and Components, Revision 025

Framatome Procedure 54-ISI-364-00, Remote Under Water In-Vessel Visual Inspection of Reactor Pressure Vessels, Vessel Internals, and Components in Pressurized Water Reactors, Revision 00

FAC

DPC Engineering Support Document, Flow Accelerated Corrosion Program, Revision 3

McGuire Unit 1 Piping Erosion Control Program, Revision 11

McGuire Unit 2 Piping Erosion Control Program, Revision 11

McGuire MP/0/B/7700/103, Erosion/Corrosion Component Inspection, Revision 001

Catawba SM/0/B/8530/001, Flow Accelerated Corrosion Component Inspection, Revision 003

Reactor Vessel Integrity Program

Engineering Support Document Reactor Vessel Integrity Program, Revision 4

McGuire MP/0/7150/033, Irradiation Capsule Removal From Lower Internals, Revision 003

McGuire MP/0/A/7150/115, Irradiation Capsule Off-Site Shipment, Revision 002

Catawba MP/0/A/7150/085, Irradiation Capsule Removal From the Reactor Lower Internals, Revision 4

WCAP-14799, Analysis of Capsule W From the Duke Power Company McGuire Unit 2 Reactor Vessel Radiation Surveillance Program

WCAP-14993, Analysis of Capsule Y From the Duke Power Company McGuire Unit 1 Reactor Vessel Radiation Surveillance Program

WCAP-15449, Evaluation of Pressurized Thermal Shock for Catawba and McGuire Units 1 &2 @ 54EFPY

WCAP-15117, Analysis of Capsule V and the Dosimeters for Capsules U and X from Duke Power Company Catawba Unit 1 Reactor Vessel Radiation Surveillance Program

WCAP-15243, Analysis of Capsule V and the Capsule Y Dosimeters from the Duke Energy Catawba Unit 2 Reactor Vessel Radiation Surveillance Program

WCAP 15285, Catawba Unit 2 Heatup and Cooldown Curves for Normal Operation Using Code Case N-460

WCAP-15448, Catawba Unit 1 Heatup and Cooldown Curves for Normal Operation Using Code Case N-460 for 51 EFPY

MP/0/A/7150, Vessel Cavity Dosimetry Capsule Removal and Installation

Steam Generator Surveillance

Steam Generator Management Program, Revision 4

Thimble Tube Inspection Program

Calculation MCC-1553.0-00-0014, Incore Instrumentation Thimble Tube Wear Review, Revision 3

Calculation CAC-1553.03-00-007 Catawba 1 ECT Results and Actions Required, Revision 2

Calculation CAC-1553.03-00-0011, Catawba 2 ECT Results and Actions Required, Revision 3

PT/0/A/4550/034, Incore Detection Thimble Eddy Current Testing, Revision 002

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WO 97022560, Catawba 2 Steam Generator C & D Enclosure Manways

WO 98137581, Catawba 1 Steam Generator A Enclosure Manway

WO 98015392, Catawba 2 Steam Generator A Enclosure Manway

WO 98482515, Catawba 1 Ice Condenser Lower Access Door Seal

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ATTACHMENT 2

MCGUIRE AND CATAWBA NUCLEAR STATIONS

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AGING MANAGEMENT PROGRAM	APPLICATION LOCATION
Alloy 600 Aging Management Review	B.3.1
Bottom-Mounted Instrumentation Thimble Tube Inspection Program	B.3.5
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Flow Accelerated Corrosion Program	B.3.14
Inservice Inspection Plan	B.3.20
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Reactor Vessel Internals Inspection	B.3.27
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Service Water Piping Corrosion Program	B.3.29
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Sump Pump Systems Inspection	B.3.32
Borated Water Systems Stainless Steel Inspection	B.3.4
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Liquid Waste System Inspection	B.3.22
Selective Leaching Inspection	B.3.28
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Waste Gas System Inspection	B.3.36
Containment Inservice Inspection Plan – IWE	B.3.7
Containment Leak Rate Testing Program	B.3.8
Flood Barrier Inspection (McGuire only)	B.3.13

AGING MANAGEMENT PROGRAM	APPLICATION LOCATION
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Technical Specification SR 3.6.16.3 Visual Inspection	B.3.33
Underwater Inspection of Nuclear Service Water Structures	B.3.35
Fire Protection Program	B.3.12
Inaccessible Non-EQ Medium Voltage Cables Aging Management Program	B.3.19
Non-EQ Insulated Cables and Connections Aging Management Program	B.3.23

ATTACHMENT 3
LIST OF ACRONYMS USED

AB	Auxiliary Building
AMR	Aging Management Review
ATWS	Anticipated Transient Without Scram
BTP	Branch Technical Position
CCW	Condenser Circulating Water
CFR	Code of Federal Regulations
CRDM	Control Rod Drive Mechanism
DBS	Design Basis Specification
DGB	Diesel Generator Building
ECT	Eddy Current Testing
EFPY	Effective Full Power Years
ESD	Engineering Support Document
EQ	Environmental Qualification program
FAC	Flow Accelerated Corrosion
FB	Fuel Building
FHA	Fire Hazards Analysis
FP	Fire Protection
HELB	High Energy Line Break
ISI	Inservice Inspection
LPSW	Low Pressure Service Water
LR	License Renewal
LRA	License Renewal Application
MP	Maintenance Procedure
NFB	New Fuel Building
NPS	Nominal Pipe Size
NSR	Non-Safety-related
NSW	Nuclear Service Water
NRR	NRC Office of Nuclear Reactor Regulation
PIP	Problem Investigation Process
PORVs	Power Operated Relief Valves
PTS	Pressurized Thermal Shock
PWSCC	Primary Water Stress Corrosion Cracking
P/T	Pressure/Temperature
QA	Quality Assurance
RAI	Request for Additional Information
RHR	Residual Heat Removal
RI	Risk Informed
RTPTS	Reference Temperature Pressurized Thermal Shock
RVI	Reactor Vessel Internals
RWST	Refueling Water Storage Tank
RTD	Resistance Temperature Detector
SBO	Station Blackout event
SFP	Spent Fuel Pool
SG	Steam Generator
SNSW	Standby Nuclear Service Water
SR	Safety-related
SSC	Systems, Structures, and Components
SSF	Standby Shutdown Facility

TLAA	Time-Limited Aging Analysis
UFSAR	Updated Final Safety Analysis Report
UHI	Upper Head Injection System
USE	Upper Shelf Energy

Duke two letter system designator system

AD	Standby Shutdown Diesel System
CA	Auxiliary Feedwater System
CF	Feedwater System
CL	Feedwater Condensate Seal System
CM	Condensate System
CS	Condensate Storage System
FD	Diesel Generator Engine Fuel Oil System
FW	Refueling Water System
KC	Component Cooling Water
KD	Diesel Generator Cooling Water System
KF	Spent Fuel Cooling System
KR	Recirculated Cooling Water System
LD	Diesel Generator Engine Lube Oil System
LF	Feedwater Pump Turbine Lube Oil System
LP	Feedwater Pump Turbine Hydraulic Oil System
NC	Reactor Coolant System
ND	Residual Heat Removal System
NI	Safety Injection System
NS	Containment Spray System
NV	Chemical and Volume Control System
NW	Containment Valve Injection Water System
RC	CondenserCirculating Water System
RN	Nuclear Service Water System
SA	Main Steam Supply to Auxiliary Equipment
SM	Main Steam System
SP	Steam Supply to Feedwater Pump Turbine System
SV	Main Steam Vent to Atmosphere System
TE	Feedwater Pump Turbine Exhaust
TF	Feedwater Pump Turbine Steam Seal System
VA	Auxiliary Building Ventilation System
VD	Diesel Building Ventilation System
VE	Annulus Ventilation System
VF	Fuel Handling Building Ventilation System
VG	Diesel Generator Starting Air System
VI	Instrument Air System
VN	Diesel Generator Air Intake and Exhaust System
VR	Reactor Building Control Rod Drive Ventilation System
VX	Containment Air Return & Hydrogen Skimmer System
WN	Diesel Generator Room Sump Pump System
ZD	Diesel Generator Engine Crankcase Vacuum System