CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9708110275 DOC.DATE: 97/08/04 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
AUTH.NAME AUTHOR AFFILIATION
MCCOLLUM,W.R. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Appreciates opportunity to meet w/NRC staff on 970717 & discuss util approach to performing integrated plant assessment & time-limited aging analysis reviews for mechanical sys & components at plant.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 40
TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-2 LA	1	1	PD2-2 PD	1	1
	LABARGE,D	1	1			
INTERNAL:	ACRS	1	1	FILE CENTER 01	1	1
	NRR/DE/ECGB/A	1	1	NRR/DE/EMCB	1	1
	NRR/DRCH/HICB	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SRXB	1	1	NUDOCS-ABSTRACT	1	1
	OGC/HDS2	1	0			
EXTERNAL:	NOAC	1	1	NRC PDR	1	1

C A T E G O R Y 1 D O C U M E N T

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM OWFN 5D-5(EXT. 415-2083) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 14 ENCL 13

Duke Power
A Duke Energy Company

W. R. McCollum, Jr.
Vice President

Duke Power Company
A Duke Energy Company
Oconee Nuclear Site
P.O. Box 1439
Seneca, SC 29679

(864) 885-3107 OFFICE
(864) 885-3564 FAX

August 4, 1997

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Mechanical Component Example IPA and TLAA
TAC Nos. M99092, 99093, 99094

Duke Power appreciates the opportunity to meet with the NRC staff on July 17, 1997, and discuss our approach to performing the Integrated Plant Assessment and Time-Limited Aging Analysis reviews for mechanical systems and components at Oconee. We continue to believe that these technical meetings are very positive and serve to improve the overall understanding of the license renewal process and the standards required to obtain a renewal license. In follow-up to this meeting, Duke Power agreed to provide a vertical slice of the mechanical reviews and is asking for staff review and feedback on the techniques taken in these examples. Three example sections of the Oconee License Renewal Technical Information Topical Report, OLRP-1001 are provided as attachments to this letter.

Attachment 1 is an example of the contents of Section 2.5 of OLRP-1001, "Mechanical Components Subject to Aging Management Review". The vertical slice being reviewed is the SSF Fuel Oil System. A copy of the Oconee flow diagram for this system with the evaluation boundary marked was provided during the meeting on July 17, 1997. Staff feedback is requested on the format, content, and level of detail provided in this section.

Attachment 2 is an example of Section 3.2 of OLRP-1001, "Aging Management Process Overview". This section provides an overview of the aging management review process and is generic to all subsequent sections of Chapter 3 of OLRP-1001. Included in Section 3.2 are descriptions of the Oconee Corrective Action Program, Administrative Controls Program, Technical Specifications and Selected Licensee Commitments Program. It is anticipated that reference will be made to these four programs throughout the remaining sections of Chapter 3. NRC feedback on the format, content, and level of detail of this section is requested.

1/1
A001

Attachment 3 is an example of Section 3.5 of OLRP-1001, "Aging Management Review of Mechanical Components". This section provides a description of the aging management review process and the results of applying this process to the Oconee SSF Fuel Oil System. Descriptions of three credited aging management programs are provided. The first program

110073

credited includes the surveillances of the Oconee Chemistry Program which cover the SSF Fuel Oil. This is an existing program which has been demonstrated to be effective. Staff feedback on the style and format of this presentation is requested. The second program described covers a proposed SSF Fuel Oil Tanks inspection program and is considered, for the purposes of this example, to be a new inspection program. Finally, a third program, the Oconee Inservice Inspection program which covers the entire SSF Fuel Oil System, is described and a demonstration is provided. Staff feedback on the format, content, and level of detail of this section is requested. Duke Power recognizes that a determination of the adequacy of these three programs by staff at this time is not appropriate. However, any comments that the staff could provide would be welcomed.

We look forward to receiving NRC feedback on the enclosed materials and suggest a meeting in September to allow the staff to provide feedback and to continue the technical discussions on the review of mechanical components. If there are any questions, please contact Bob Gill at 704-382-3339.

Very Truly Yours,

W. R. McCollum Jr., Site Vice President
Oconee Nuclear Station

Attachments 1, 2, 3

bxc: (w/o attachment)
Mike Tuckman EC07H
Bill McCollum ON01VP
Roberta Bowman EC06B

(w/attachment)
Oconee License Renewal Project
Mel Arey EC09O
Mitch Baughman EC12V
Paul Colaianni EC12R
Terry Cox EC12R
Bob Gill EC12R
Rounette Nader ON03MS
Paul Newton PB05E (2 copies)
Debbie Ramsey EC12R
Greg Robison EC12R
Mike Semmler EC12R
Tom Yocum MG03C1

Bill Foster ON01VP
Mano Nazar ON01VP
Mike Bailey ON03RC
Ed Burchfield ON03RC
Skip Copp EC05O
ELL EC05O

GLRP Team
Bill Mackay - Entergy Operations, Inc.
Dave Masiero - GPU Nuclear Corporation
Dave Firth - Framatome Technologies, Inc., Lynchburg, VA (OF57)
Mark Rinckel - Framatome Technologies, Inc., Lynchburg, VA (OF51)
Bob Borsum - Framatome Technologies, Inc., Rockville, MD

Industry Contacts
John Carey - EPRI
Tricia Heroux
Fred Polaski - PECO
Ray Baker - Southern Nuclear

xc:

L. A. Reyes
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, NW, Suite 2900
Atlanta, GA 30323-0199

C. I. Grimes
Director, License Renewal Project Directorate
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

M. A. Scott
Senior NRC Resident Inspector
Oconee Nuclear Station

D. E. La Barge
Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

S. T. Hoffman (5 copies)
Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Max Batavia
Bureau of Radiological Health
2600 Bull St.
Columbia, SC 29201

Attachment 1

Example of Section 2.5 of OLRP - 1001

Mechanical Components Subject to an Aging Management Review

2.5 Mechanical Components Subject to an Aging Management Review

The license renewal evaluation boundaries of Oconee mechanical systems, including those contained in the Standby Shutdown Facility (SSF) and in Keowee Hydro Station, were determined on the basis of the review described in Section 2.2 of OLRP-1001. The methodology used to identify the individual mechanical components and component groups that are subject to aging management review is described in the following paragraphs.

Mechanical components are considered to be those installed components that contain a fluid, including air or gas. Supports and anchorages are considered to be structural components and are addressed in Section 2.7 of OLRP-1001. Certain electrical components that are attached to mechanical components, such as motors or instrumentation are addressed in Section 2.6 of OLRP-1001.

The methodology used to identify the mechanical components subject to an aging management review at Oconee is consistent with the guidance provided in NEI 95-10, Rev 0 [Reference 1]. Specifically, Section 4.1 of NEI 95-10 describes acceptable methods for the identification of structures and components subject to an aging management review. It describes a two step process: (1) establishing evaluation boundaries (NEI 95-10, Section 4.1.1); and (2) determining structures and components within these boundaries subject to an aging management review (NEI 95-10, Section 4.1.2).

In general, the mechanical components subject to an aging management review are determined in the following manner:

- a menu of Oconee mechanical component types at Oconee was developed,
- the mechanical component types which may be grouped together into component groups was determined,
- the mechanical components within the evaluation boundaries that would be subject to an aging management review were identified, and
- for the mechanical components and component groups identified - materials of construction and operational environments were identified.

Each of these steps is described in detail in the following sections.

2.5.1 Oconee Component Types

The first step in the identification of the mechanical components subject to an aging management review was to develop a menu of mechanical component types at Oconee. This step provides a basis for identifying the mechanical components within the license renewal evaluation boundary (marked Oconee mechanical system flow diagrams) that are subject to an aging management review. Oconee mechanical flow diagrams have been

reviewed to determine the mechanical component types that exist in the plant. Table 2.5-2 provides the resulting menu of mechanical component types and component groups subject to an aging management review for Oconee.

2.5.2 Component Groupings

The second step involves grouping several similar component types together. The total number of mechanical components in a system could be very large and many of these components are not uniquely identified. To facilitate the aging management review, therefore, many components, having "identical" or "similar" characteristics, have been grouped together so that a single aging management review could be performed for the entire group. The components within these groups, referred to as a component groups, have been evaluated together based on the pertinent common characteristics of the components in the group, such as similar design, materials, environment, or function.

Based on these considerations, the component groups for mechanical components at Oconee includes pipe (including piping, tubing, and fittings), ductwork, valves (bodies only), and bolted closures for which a common evaluation can be made. Component groupings are not used for components that have unique design characteristics. For example, heat exchangers, pumps (casings only), tanks, and vessels are identified, listed and evaluated individually since they have unique design considerations.

2.5.3 Identification of Components Subject To An Aging Management Review

The third step is the identification of mechanical components within the evaluation boundaries that are subject to aging management review. Oconee mechanical flow diagrams have been marked to indicate the evaluation boundaries for license renewal and have been reviewed using the component types and component groups menu to identify the components and component groups subject to an aging management review. The evaluation boundaries of mechanical systems are provided by marked Oconee flow diagrams [Reference 2]. For the Reactor Coolant System, additional descriptions of the components that are subject to aging management review are provided in Section 2.4 of OLRP-1001.

For the purpose of this mechanical example, the SSF Fuel Oil flow diagram was provided during the Duke/NRC July 17, 1997 meeting.

Discussion of the identification of component intended functions will be provided in the formal submittal.

2.5.4 Component Material and Environment Identification

The final step in this portion of the integrated plant assessment is the identification of component materials of construction and operating environment. A majority of the aging effects applicable to a component are directly related to the materials of construction of

the component and how the material is affected by the environment in which it resides. Industry, including Duke, has focused on managing the effects of aging of materials in environments that lead to component degradation. This focus has addressed component aging via regulatory activity during the current licensing term. For example, reactor vessel inspection, steam generator tube inspection, and secondary piping inspection programs are several examples of regulatory programs which address management of specific aspects of component aging during the current term.

The industry has performed significant research to determine the evaluation criteria for assessing the effects of aging on components. Duke has reviewed this body of information and the results of the research which are contained in a library of reports that will be referenced during the aging management review. Since a majority of aging effects are dependent upon material and environmental considerations, the aging management review of components is facilitated by determining the materials of construction of the components and the environments to which the components are exposed (both internal and external environments). The process for identifying materials and environments is provided in the following sections.

2.5.4.1 Identification Of Materials Of Construction

The materials of construction of a component have a major influence on the evaluation of the aging effects applicable to the component. Oftentimes, the combination of the environment and materials of construction must be considered, along with other potential stressors (e.g. temperature and pressure), to determine the aging effects applicable to a component. Therefore, as components subject to an aging management review are identified, their materials of construction are also identified and listed.

For major components (e.g., tanks, vessels, heat exchangers, and pumps) the materials of construction are provided in appropriate design documents (drawings, specifications, materials lists, etc.). Piping materials of construction have been identified by referring to the "Design Parameters" listed on the Oconee mechanical flow diagram. Valve and miscellaneous process component materials were applied to be compatible with the piping. Generally, material selection of such components was based on the criteria provided in applicable Oconee engineering documents and materials selected were the same as the piping materials. In a small number of cases, a valve or a miscellaneous process component may be constructed of a material other than that called for in the piping specifications. For example, stainless steel components may be found in carbon steel raw water process lines. In all cases where an alternate material was used, the substitution was reviewed and approved by appropriate Oconee design personnel and documented in appropriate engineering records. These alternate materials were considered as part of the component materials identification here.

2.5.4.2 Identification of Environments

The division of mechanical systems and components by environment makes it easier to proceed through the aging management review by allowing components in systems with

similar environments to be evaluated together while also providing a convenient grouping of systems into manageable sizes for component screening and aging management reviews. All components will have at least two environments that must be considered - an internal surface environment and an external surface environment. Additionally, heat exchangers are unique in that they have three potentially different environments that must be considered. The internal environments for subject components are determined by reviewing appropriate design documentation. Internal environments include:

- Air-Gas Environments (Includes Vacuum)
- Borated Water Environments
- Oil and Fuel Oil Environments
- Raw Water Environments
- Treated Water Environments (Includes Steam)
- Ventilation Environments

External environments will be provided in the formal submittal.

2.5.5 Conclusion

The application of the methodology described in this section of OLRP-1001 provides marked Oconee mechanical system flow diagrams showing the evaluation boundaries, component types and component groups menu, and tables of components subject to aging management review. This information provides the input to the aging management review for the mechanical equipment within the scope of license renewal, which is provided in Section 3.5 of OLRP-1001.

2.5.6 References

---

1. NEI 95-10 Rev 0

2. Reference document containing marked Oconee Flow Diagrams is in preparation

Table 2.5-1 Oconee, SSF and Keowee Mechanical Systems Within the Scope of License Renewal

(Listed by Internal Environment)

Air/Gas Systems
Breathing Air (Containment Isolation Portion Only)
Chemical Addition (Post Accident Gas Sampling Portions)
Containment Hydrogen Control
Gaseous Waste Disposal (Containment Isolation Portion Only)
Instrument Air (Containment Isolation Portion Only)
Leak Rate Test (Containment Isolation Portion Only)
Nitrogen Purge and Blanket
Vacuum
SSF Air Intake and Exhaust
SSF Starting Air
Keowee Carbon Dioxide
Keowee Depressing Air
Keowee Governor Air

Raw Water Systems
Auxiliary Service Water
Condenser Circulating Water
High Pressure Service Water
Low Pressure Service Water
SSF Auxiliary Service Water
SSF Sanitary Lift
Keowee Service Water

Keowee Turbine Generator Cooling Water
Keowee Turbine Sump Pump

Borated Water Systems
Chemical Addition (Borated Water Portions)
Coolant Storage (Containment Isolation Portion Only)
Coolant Treatment
Core Flood
High Pressure Injection
Liquid Waste Disposal (Containment Isolation Portion Only)

Low Pressure Injection
Reactor Building Spray
Reactor Coolant
Spent Fuel Cooling
SSF Reactor Coolant Makeup

Treated Water Systems
Chemical Addition (Treated Water Portions)
Component Cooling Water
Condensate
Demineralized Water (Containment Isolation Portion Only)
Emergency Feedwater
Feedwater
Filtered Water (Containment Isolation Portion Only)
Main Steam
SSF Diesel Jacket Water Cooling
SSF Drinking Water

Oil and Fuel Oil Systems
Lube Oil
Reactor Coolant Pump Motor Oil Collection
SSF Diesel Generator Fuel Oil
SSF Diesel Generator Lubrication Oil
Keowee Generator High Pressure Oil
Keowee Governor Oil
Keowee Turbine Guide Bearing Oil

Ventilation Systems
Auxiliary Building Ventilation
Control Room Pressurization and Filtration
Penetration Room Ventilation
Reactor Building Cooling
Reactor Building Purge (Containment Isolation Portion Only)
SSF HVAC

Table 2.5-2 Menu of Mechanical Component Types and Their Intended Functions

(Working List)

COMPONENT	INTENDED FUNCTIONS
Accumulators	
Agitator (Mixer)	
Air Ejectors	
Air Handling Units	
Air Motors	
Air/Gas Dryers	
Annubar	
Blenders	
Bolted Closures	
Chillers	
Condensers	
Continuous Drain Orifices	
Delay Coils	
Demineralizers	
Discharge Accumulator (Damper)	
Distributors	
Ductwork	
Eductors	
Electric Heaters (Pressure Boundary Only)	
Evaporators	
Expansion Joints	
Expansion Tanks	
Feedwater Heaters	
Filters (Pressure Boundary only)	
Fire Hoses	
Flexible Couplings	
Flexible Hoses	
Flow Glass	
Flow Nozzles	
Flow Orifices	
Flow Restriction Orifices	
Flow Restrictors (Pipe Fitting)	
Flow Switches (Inline)	
Flowmeter (Venturi)	
Funnels	
Governor Air Boost	
Heat Exchangers	See Table 2.5-3
Heating/Cooling/Refrigerant Coils	
Hotwells	
Level Glass	
Lubricators	

Table 2.5-2 Menu of Mechanical Component Types and Their Intended Functions (continued)

(Working List)

COMPONENT	INTENDED FUNCTIONS
Mechanical Bellows	
Mechanical Joints	
Moisture Separator Reheaters	
Motor Coolers	
Mufflers/Silencers	
Oil Coolers	
Pipe (Includes: Pipe Fittings, Tubing, Tubing Fittings, Thermowells, Spool Pieces, Blank Flanges, Blind Flanges, Quick Disconnects)	Provide pressure boundary so that sufficient flow and adequate pressure is delivered.
Pitot Tubes	
Pressure Vessels	
Pressurizer	
Pumps (Casings only)	
Room/Building Heaters/Coolers	
Screens/Grilles	
Spargers	
Spectacle Flanges	
Spray, Mulsifyer, Sprinkler Nozzles	
Strainers	
Surge Tanks	
Tanks	Provide a fluid retaining boundary such that the volume of fluid maintained within the tank is in excess of that required by applicable specifications.
Turbines	
Turbochargers	
Valve Bodies: (Includes: Traps, Throttle Valves, Vacuum Breakers, Check Valves, Automatic Recirculation Control Valves, Automatic Flow Control Valves, Pressure Regulating Valves, Temperature Regulating Valves, Air and Vacuum Valves, Safety/Relief Valves, Refrigeration Expansion Valve, Single Cycle Relief Valve (Rupture Disks), Three Way Valves, Three Way Temperature Regulating Valves, Three Way Pressure Regulating Valves, Ram Valves, Fire Hydrants)	

Table 2.5-3 Specific Heat Exchangers and Their Intended Functions

(later)

Attachment 2

Example of Section 3.2 of OLRP - 1001

Aging Management Review Process Overview

3.2 AGING MANAGEMENT REVIEW PROCESS OVERVIEW

Structures, components and component groups within the scope of license renewal that require aging management reviews, and their intended functions are identified and listed in Chapter 2 of OLRP-1001. The approach used by Duke to perform the aging management review of these structures, components and component groups is consistent with that provided in NEI 95-10, Section 4.2 [Reference 1]. The aging management review consists of identifying the applicable aging effects for each of the identified structures, components and component groups and then demonstrating the ability of programs to manage those effects. The aging management review results for Oconee Nuclear Station are presented Chapter 3 of OLRP-1001 in the following order:

- Reactor Building (Containment)
- Reactor Coolant System Components
- Mechanical Components
- Electrical Components
- Structures and Structural Components

The aging management review is considered complete when the credited programs provide reasonable assurance that the applicable aging effects are managed so that the intended function(s) will be maintained consistent with the current licensing basis for the renewal license period of extended operation. The process described in this section is intended to meet the requirements of §54.21(a)(3) and to permit the NRC staff to make the finding identified in §54.29(a).

The following sections provide a brief overview of the process that has been used to identify the applicable aging effects and to demonstrate that credited programs are effective to manage these aging effects during the period of extended operation. A description of the process for describing new programs for license renewal is included in this demonstartion. Subsequent sections in Chapter 3, as noted above, provide the results of implementing this aging management review process for the structures and components at Oconee that are required to be reviewed for license renewal.

Finally, descriptions are provided for the following administrative programs which are being referred to throughout the remaining sections of OLRP-1001:

- Oconee Corrective Action Program
- Oconee Administrative Controls Program
- Oconee Technical Specifications
- Oconee Selected Licensee Commitments

These existing plant programs are considered to be strong elements of the overall demonstration of the effectiveness of credited aging management programs which is required by the integrated plant assessment.

3.2.1 Identification of Applicable Aging Effects

The applicable aging effects that can challenge the intended functions have been identified for each of the structures, components and component groups by reviewing the materials of construction and the service environment for each and then by identifying the aging effects understood from engineering experience to be applicable to these material and environment combinations.

In order to provide assurance that the identified aging effects for a specific material-environment combination are the only aging effects that are of concern for license renewal, a review of industry experience and NRC generic communications relative to structures, components, and component groups was performed. In addition, a review of relevant Oconee experience has been performed which provides further confidence that the set of applicable aging effects for the specific material-environment combination have been identified. The cumulative effect of these reviews provides reasonable assurance that the aging effects of concern for the specific material-environment combination have been identified.

3.2.2 Aging Management Program Description and Demonstration

The programs that are credited for managing the effects of aging are described in applicable sections of Chapter 3 of OLRP-1001. The demonstration process consists of evaluating these programs by using to the extent practical the following guidance, which meets the intent of Section 4.2 of NEI 95-10, Rev 0:

1. The scope of the credited program(s) includes the specific structure, component or component group subject to aging management review;

2. Parameters that provide direct information about the relevant aging effects(s) on the structure, component or component group, and their intended functions are monitored, inspected, and/or tested;

3. The frequency of the activity is such that the aging effect(s) is detected before a loss of the structure's or component's intended function occurs;

4. Alert values or acceptance criteria are provided against which the need for corrective action is evaluated (Note that when a program includes engineering evaluation and judgment, a description of the engineering judgment process should be provided);

5. Corrective action will be taken in a timely manner when these acceptance criteria are not met (For additional information concerning the Oconee Corrective Action Program, see Section 3.2.4);

6. The effectiveness of the program(s) is demonstrated by recent Oconee operating experience; and

7. The program(s) is (are) subject to administrative controls (For additional information concerning the Oconee Administrative Controls Program, see Section 3.2.5).

Enhancements will be made to these programs, as necessary, to provide additional assurance that they are capable of managing the identified aging effects. The aging management review is maintained in documentation as required by 10 CFR Part 54, §54.37.

3.2.3 New Inspections for License Renewal

In certain instances, the Oconee integrated plant assessment has determined that new inspection programs need to be implemented to provide additional assurance that the identified intended functions of certain structures and components will be maintained for the period of extended operation. These new inspections, described in the applicable sections of Chapter 3 of OLRP-1001, have been developed using the following guidance. This guidance meets the intent of the guidance provided in Section 4.3 of NEI 95-10, Rev 0:

1. The purpose of the new inspection program should be to provide reasonable assurance that the specific aging effect is adequately managed;

2. The scope of the new inspection program should be clearly described. The scope may be a representative sample or biased sample, as justified;

3. The inspection methods should be described and be capable of (a) detecting the effects of aging before the structure or component would lose the ability to perform its intended function under design conditions, or (b) demonstrate that the structure or component intended function will be maintained during the period of extended operation without the need for an aging management program;

4. The new inspection program will consist of a baseline inspection and additional inspections if the evaluation of the baseline results indicate that further inspections are appropriate;

5. The new inspection program should include a methodology for analyzing the results of the inspection against applicable acceptance criteria;

6. The new inspection program should discuss corrective actions to be taken when these acceptance criteria are not met. (For additional information concerning the Oconee Corrective Action program, please see Section 3.2.4);

7. The new inspection program should be subject to administrative controls (For additional information concerning the Oconee Administrative Controls program, please see Section 3.2.5).

3.2.4 Corrective Action Program

One of the fundamental elements of an effective aging management program is the corrective action process. The following is a brief description of the Oconee Corrective Action Program.

Duke Power has established a Quality Assurance Program that conforms to the applicable regulatory requirements including 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants". The Duke Power program is presented in Duke - 1A [Reference 2] which is incorporated by reference into Chapter 17 of the Oconee UFSAR [Reference 3].

Station personnel are responsible for the implementation of the quality assurance program as it pertains to the performance of their activities. Specific to this responsibility is the requirement for informing responsible supervisory personnel and/or for taking appropriate corrective action whenever any deficiency in the implementation of the requirements of the program is identified. Directives require that conditions adverse to quality be corrected.

The processes for the identification of problems and implementation of corrective actions, which include determination of the extent of problems, actions to prevent recurrence, and reporting to NRC, are outlined in the following Nuclear System Directives (NSDs):

NSD 210 - Corrective Action Program
NSD 204 - Operating Experience Program
NSD 208 - Problem Investigation Process
NSD 212 - Cause Analysis
NSD 203 - Operability
NSD 216 - Significant Event Investigation Teams
NSD 202 - Reportability

Collectively these systems directives require site personnel to identify conditions adverse to quality, including nonconformances in design documents, as-built plant drawings, and procedures. They provide a consistent method for identifying problems, reporting problems, investigating such problems through a controlled process, controlling and

tracking corrective actions, and performing periodic audits to verify compliance. Requirements are also in effect for trending of specific issues to address programmatic concerns and to identify improvements where necessary to preclude recurrence.

Identified conditions adverse to quality are assessed to determine their impact upon operability in accordance with NSD 203. After they are evaluated, conditions adverse to quality are assigned a priority for timely corrective action based upon their significance to safety, and are subjected to root cause evaluations. Problems are tracked through completion of corrective action and are trended to identify potentially significant adverse conditions. Station processes are also in place to prevent recurrence of problems, and to identify and resolve generic issues.

NSD 210 (Corrective Action Program) provides the overall direction and identifies the various input programs that constitute the corrective action program. The problem identification process is intended to capture issues that are adverse to quality, situations or conditions not in accordance with requirements / expectations, and operating experience external to Duke which need to be evaluated and corrected if applicable to Duke nuclear plants.

Identified problems are resolved using one of two major processes: the Problem Investigation Process (PIP) and / or the Work Management System (WMS). WMS is designed to identify and resolve routine maintenance problems. In contrast, the PIP is designed to address non-routine problems which require further evaluation.

The Problem Investigation Process is the systematic process whereby a problem is identified, screened for significance, and evaluated as required to determine operability, NRC reportability, cause and appropriate resolution. Each one of these activities is addressed in an NSD.

NSD 212 (Cause Analysis) provides information on the process to conduct a cause analysis using several industry accepted methodologies. This systematic approach provides reasonable assurance that problems are appropriately prioritized, that they are evaluated to determine their extent of impact, and that they are resolved commensurate with the level of significance of the issue. Depending on the significance of the problem, the PIP may require:

1. no further action - trending only,
2. an apparent cause evaluation intended to fix the immediate problem and prevent recurrence of the problem, or
3. a root cause analysis to assist in developing corrective actions to prevent recurrence.

The PIP program requires that for any corrective actions identified, both 'Proposed Corrective Action' and 'Actual Corrective Action' be specified and tracked. Any

problem can have multiple corrective actions assigned. This allows both immediate corrective actions and long term corrective actions to be specified and tracked independently. Proposed resolution, proposed corrective action, and actual corrective action all require approval by assigned personnel, with overall approval of the issue or concern after completion of all steps.

The PIP program, as well as other related programs, contain guidelines for identifying, resolving and correcting trends on less significant or performance related problems. These programs allow emerging, recurring process and performance issues to be identified, tracked and resolved.

Additional information concerning the above programs has been provided in the Duke Power letter to NRC concerning adequacy and availability of design information [Reference 4]. The Corrective Action Program is one of the strong elements in the Oconee Integrated Plant Assessment for License Renewal.

3.2.5 Administrative Controls Program

Another one of the fundamental elements of an effective aging management program is the administrative process by which the program is implemented. The following is a brief description of the Oconee Administrative Controls Program.

Oconee has a well established administrative controls program that governs the development, review, revision, approval and implementation of procedures. Procedures are developed to cover plant operating activities including, but not limited to, the following:

1. Maintenance
2. Periodic Performance Testing
3. Chemistry
4. Inservice Inspection
5. Surveillance Requirements (Technical Specifications)

Procedures are developed and revised by knowledgeable individuals and follow the requirements set forth in NSD 703 (Administrative Instructions for Station Procedures). Each procedure that is developed or revised is required to be reviewed by a qualified reviewer with the objective of verifying that information contained within the procedure:

1. is accurate, complete, and that sufficient documentation is contained to assure that the intent of the procedure is fulfilled;

2. satisfies the requirements set forth in the Oconee Technical Specifications, Selected Licensee Commitments (Chapter 16 of the Oconee UFSAR), the Oconee UFSAR, and other licensing and technical documents; and

3. does not place the facility in violation of Technical Specifications or Selected Licensee Commitments, or in operation outside the previously analyzed design shown on design documents.

The qualified reviewer also makes the determination of whether or not any cross-disciplinary reviews are necessary. Procedure development and revisions are also subject to 10 CFR Part 50, §50.59 reviews. After all required and appropriate reviews have been completed, a final version of the procedure is prepared. Upon approval by the designated responsible implementing manager, the procedure becomes available for use.

Additional discussion of the administrative controls program is contained in Section 13.5 of the Duke - 1A [Reference 2], Oconee UFSAR [Reference 3], and the Duke Power letter to NRC concerning adequacy and availability of design information[Reference 4]. The Administrative Controls Program forms a solid basis for the demonstration of effectiveness of aging management programs credited in the in the Oconee Integrated Plant Assessment for License Renewal.

3.2.6 Oconee Technical Specifications

Technical Specifications are expected to be an effective aging management program for several components within the scope of license renewal and subject to aging management review. Technical Specifications include limiting conditions for operation, which are generally the minimum functional capability or performance levels for equipment for safe operation of the facility. Technical Specifications also include surveillance requirements relating to testing, calibration, or inspection. These surveillance requirements verify that the necessary quality of systems, structures and components is maintained, that facility operation is within safety limits, and that limiting conditions for operation continue to be met. In the event detrimental performance or conditions are identified, mitigating actions are taken in a timely manner to restore the system, structure or components to its acceptable condition. The Commission has concluded that programs such as Technical Specifications provide reasonable assurance that the aging effects of active components can be managed [Reference 5, Section III.d.v of the Supplementary Information]. Similarly, it is reasonable to expect that technical specifications could be shown to be effective at managing the aging effects of components that are not considered to be active.

Oconee is in the process of converting its existing custom Technical Specifications (CTS) to a version termed Improved Technical Specifications (ITS) which are based on NUREG-1430 [Reference 6]. The Oconee-specific ITS are expected to be approved by NRC in 1998 and implemented at Oconee within a few months thereafter. Technical Specifications are required to be implemented generically by 10 CFR Part 50, §50.36 and for Oconee specifically by License Condition 3.B of the Facility Operating License for each of the Oconee units. The Technical Specifications are initially approved by

NRC upon issuance of an operating license and any changes to the specifications must be proposed by the licensee and approved by the NRC by the issuance of an amendment to the operating license. Technical justifications for the proposed changes are included in each licensee request for a change. The results of the NRC evaluation of the supporting technical justification are included in a safety evaluation attached to the approved license amendment.

Although not a part of the Technical Specifications, the Bases for the technical specifications provide important background information supporting the specific requirements contained in the individual technical specifications. The Bases for the Oconee ITS are being derived from the standard bases provided in NUREG-1430. Surveillances and programs implemented as a result of the Oconee Technical Specifications are expected to be important in the Oconee Integrated Plant Assessment for License Renewal.

3.2.7 Oconee Selected Licensee Commitments

Similar to Oconee Technical Specifications, the Oconee Nuclear Station Selected Licensee Commitment program is expected to be effective at managing the aging effects of certain components. The Oconee Nuclear Station Selected Licensee Commitment program provides a single location where certain operational related commitments are controlled. While this program constitutes Chapter 16, "Selected Licensee Commitments" of the Oconee UFSAR, the contents of the program are maintained in a separate manual. This manual, "Oconee Nuclear Station Selected Licensee Commitments Manual," facilitates the administration of this program, including timely revision and addition of important commitments, and user convenience.

The "Oconee Nuclear Station Selected Licensee Commitments Manual" contains commitments to control important plant equipment and operating conditions not controlled elsewhere. Issuance of the manual, as well as subsequent revisions, are done under the approval of the Station Manager [Reference 3, Chapter 16]. Certain Selected Licensee Commitments are credited as a part of the Oconee Integrated Plant Assessment for License Renewal as effective programs to manage the effects of aging for certain components.

1 **3.2.8 References**

1. *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule,* Nuclear Energy Institute, NEI 95-10, Revision 0, March 1996.

2. Duke Power Topical Report, Duke 1-A, *Quality Assurance Program,* as revised.

3. Oconee Nuclear Station Updated Final Safety Analysis Report, as revised.

4. M. S. Tuckman (Duke) letter dated February 10, 1997 to Document Control Desk (NRC), Docket Nos. 50-269, 50-270, and 50-287, Adequacy and Availability of Design Basis Information.

5. Nuclear Power Plant License Renewal Rule, 60 FR 22461, May 8, 1995.

6. NUREG-1430, "Standard Technical Specifications for Babcock and Wilcox Plants," Revision 1, NRC, April 1995.

Attachment 3

Example of Section 3.5 of OLRP - 1001

Aging Management Review of Mechanical Components

3.5 MECHANICAL COMPONENTS

Components and component groups of Oconee mechanical systems, Standby Shutdown Facility (SSF) mechanical systems, and Keowee Hydro Station mechanical systems within the scope of license renewal that require aging management reviews along with their intended functions were identified and listed in Section 2.5. The aging management review of mechanical components and component groups has been performed using selected internal environmental groupings as a convenience to the reviewer. The internal environments for these mechanical components and component groupings include:

- Air-Gas Environments (Includes Vacuum)
- Borated Water Environments
- Oil and Fuel Oil Environments
- Raw Water Environments
- Treated Water Environments (Includes Steam)
- Ventilation Environments

Each mechanical component has at least two environments that must be considered: an internal environment and an external environment. Additionally, heat exchangers are unique in that they have three potentially different environments that must be considered and therefore, they are grouped separately.

The approach used to perform the aging management review of the mechanical components has been described previously in Section 3.2. The aging management review consists of identifying the applicable aging effects for each of the components and component groups within each of the above internal environmental groupings and then demonstrating the ability of Oconee programs to manage those effects while considering all environments to which they are exposed.

Applicable aging effects may be determined based upon consideration of construction, operating environment, and stress. In many instances aging effects may be assessed irrespective of the component type being evaluated. Specifically, different component types constructed from the same material and located in the same environment will experience similar aging effects. For mechanical components, the aging effects that have been generically considered are:

- cracking (initiation and growth),
- reduction in fracture toughness,
- loss of material,
- distortion, and
- loss of mechanical closure integrity.

The specific aging effects for individual mechanical components and component groupings have been determined based on review of the specific materials and environments for the specific components and component groupings. Several publicly available technical reports and documents have been utilized to determine the aging effects applicable to the various material and environmental combinations under review. The documents and technical reports used include, but are not limited to:

- *Metals Handbook,* Desk Edition, American Society for Metals, 1985

- *Corrosion Engineering,* M. G. Fontana, Third Edition, McGraw Hill, 1986

- *Corrosion and Wear Handbook for Water-Cooled Reactors,* D. J. DePaul, McGraw Hill, 1957

- *Stress-Corrosion Cracking,* R. H. Jones, American Society for Metals International, 1992

- *Corrosion Handbook,* H. H. Uhlig, John Wiley and Sons, 1948

- *Corrosion and Corrosion Control,* H. H. Uhlig, John Wiley and Sons, 1963

- *Aging Management Guideline for Commercial Nuclear Power Plants-Heat Exchangers,* Sandia National Laboratories, SAND 96-7070, 1994

- *Aging Management Guideline for Commercial Nuclear Power Plants-Tanks and Pools,* Sandia National Laboratories, SAND 96-0343, 1996

In addition to the above documents, numerous EPRI, NRC, Owners Group and other publicly available and relevant technical reports were reviewed during the course of performing the Integrated Plant Assessment and identifying the aging effects of concern. In order to validate the identified aging effects, a review of industry experience, including relevant Oconee experience, and NRC generic communications relative to mechanical systems and components was performed. The cumulative results of these reviews provides reasonable assurance that the set of aging effects of concern for the specific material-environment combination have been identified.

Oconee programs and activities are credited to manage the identified effects of aging. When an existing program is credited, a demonstration of the effectiveness of the program is provided, using the process described previously in Section 3.2.2. When a new program is required to be implemented to manage one or more identified aging effects, then a description of the new inspection program is provided.

The aging management review is considered complete when the credited programs provide reasonable assurance that the applicable aging effects are managed so that the intended function(s) will be maintained consistent with the current licensing basis for the renewal license period of extended operation. The process described in this section is intended to meet the requirements of §54.21(a)(3) and to permit the NRC staff to make the finding identified in §54.29(a).

The aging management reviews of the mechanical components within the various applicable system groupings are provided in the following sections. For each environmental group of mechanical components, a brief description of each system is provided and is followed by the applicable aging effects identification for the components under review and then the appropriate aging management program descriptions.

In addition to the above aging management reviews, the time-limited aging analyses associated with the mechanical system components and component groups that were identified in Table 1.4-1 of this report have been evaluated, and the results are presented in Section 3.5.10.

3.5.1 AGING MANAGEMENT REVIEW OF MECHANICAL COMPONENTS IN AIR/GAS SYSTEMS

To be provided later.

3.5.2 AGING MANAGEMENT REVIEW OF MECHANICAL COMPONENTS IN BORATED WATER SYSTEMS

To be provided later.

3.5.3 Aging Management Review of Mechanical Components in Oil and Fuel Oil Systems

The following mechanical systems have been determined to have an internal environment of primarily oil or fuel oil:

- Lube Oil
- Reactor Coolant Pump Motor Oil Collection
- SSF Fuel Oil
- SSF Lube Oil
- Keowee Generator High Pressure Oil
- Keowee Governor Oil
- Keowee Turbine Guide Bearing Oil

Descriptions of each of the above listed systems will be provided.

3.5.3.1 System Descriptions

3.5.3.1.1 SSF FUEL OIL

The SSF Fuel Oil System stores and supplies fuel oil to the SSF diesel engines. The SSF is used to mitigate the consequences of certain design basis events, postulated fires, and station blackout. It is seismically designed and required by the current licensing basis to function after a seismic event. The SSF Fuel Oil System is normally in standby, supplying fuel only when the SSF diesels are in operation. The day tank and storage tank are carbon steel and open to atmosphere. The exterior surface of the day tank is exposed to ambient conditions of the SSF (normal interior building environment) while the storage tank is buried below grade level. The interior at the top of the tanks and the interior of the piping connected to the tops of the tanks are exposed to air. The remaining portions of the piping, valves, pumps, filters, flow element, and strainers are either stainless steel or carbon steel and are continually exposed to fuel oil. Portions of the piping connecting the storage tank to the SSF are under ground; the exterior surfaces of the remaining components are exposed to ambient conditions of the SSF (normal interior building environment). The SSF Fuel Oil System is primarily classified as Oconee Pipe Class C (ASME Section III Class 3), although portions of it are Oconee Pipe Class G (ANSI B31.1) but not within the scope of license renewal. The actual piping class boundaries are indicated on the Oconee Flow Diagram for this system (See Handout #8, July 17, 1997 Duke/NRC meeting).

The aging management review of the components and component groups within the portion of the above systems that are within the scope of license renewal consists of the identification of the applicable aging effects and demonstration that Oconee programs and activities are capable of managing these aging effects. Section 3.5.3.2.1 provides the applicable aging effects for the material-environment combinations that have been

identified for the components and component groups within the Oconee Oil and SSF Fuel Oil Systems and Section 3.5.3.2.2 identifies the Oconee programs that either are or will be used to manage these aging effects during the renewal term. Some of these programs are generic to several systems. Therefore, the demonstration for all credited programs is provided in Section 3.5.8.

3.5.3.2 Aging Management Review

3.5.3.2.1 APPLICABLE AGING EFFECTS

3.5.3.2.1.1 CARBON STEEL COMPONENTS

The applicable aging effect for the interior surfaces of carbon steel components in the SSF Fuel oil System is loss of material due to water or bacterial/fungal activity in the fuel oil and moist air entering the system through the tank vent. The carbon steel component in the SSF Fuel oil System are pipe, valves, pumps, tanks, strainers and filters. A source of water and bacterial/fungal activity is delivery tankers. Another possible source of water is condensation inside the storage tanks.

The applicable aging effect for the interior surfaces of carbon steel components in the Oconee oil systems ...

3.5.3.2.1.2 STAINLESS STEEL COMPONENTS

The applicable aging effect for the interior surfaces of stainless steel components is loss of material due to corrosion which may be caused by water or bacterial/fungal activity in the fuel oil. The stainless steel components in the SSF Fuel Oil System are pipe, valves, strainers, and filters. Sources of moisture include the fuel oil delivery tankers and condensation within the tanks. Loss of material in stainless steel components exposed to contaminated fuel oil could result in the loss of pressure boundary and leakage of the fuel oil.

The applicable aging effect for the interior surfaces of stainless steel components in the Oconee oil systems ...

3.5.3.2.1.3 BOLTED CLOSURES

To be provided later

3.5.3.2.1.4 EXTERNAL SURFACES

To be provided later

3.5.3.2.1.5 INDUSTRY EXPERIENCE

In order to assure that the set of applicable aging effects is complete, a review of industry experience was performed. The review indicated a low incidence of failure of components exposed to oil and fuel oil and did not identify any incidents of corrosion-related failures.

In addition to the above search, a review of NRC generic communications was performed. The following NRC generic communications were identified:

- CR 80-11 "Emergency Diesel Generator Lube Oil Cooler Failures"
- IN 79-23 "Emergency Diesel Generator Lube Oil Coolers"
- IN 89-07 "Failures of Small-Diameter Tubing in Control Air, Fuel, Oil, and Lube Oil Systems Render Emergency Diesels Inoperable"
- IN 91-46 "Degradation of Emergency Diesel Generator Fuel Oil Delivery Systems"
- IN 93-48 "Failure of Turbine-Driven Main Feedwater Pump to Trip Because of Contaminated Oil"
- IN 94-58 "Reactor Coolant Pump Lube Oil Fire"
- GL 83-26 "Clarification of Surveillance Requirements for Diesel Fuel Impurity Level Tests"

No NRC Bulletins were identified that relate to oil and fuel oil systems. The NRC generic communications concern either failures due to vibration or contamination of the oil. Failures due to vibration are not considered to be aging effects of concern for license renewal. Contamination of the oil or fuel oil has occurred and can lead to loss of material due to corrosion. Loss of material can lead to loss of the intended function of pressure boundary such that sufficient flow and adequate pressure are not delivered.

As a result of the review of industry information and NRC generic communications, no additional aging effects beyond those discussed in this section have been observed. Therefore, the applicable aging effect for the period of extended operation for the mechanical components in oil and fuel oil systems is loss of material due to corrosion when moisture is present and/or bacterial/fungal activity. Loss of material due to corrosion needs to be managed for the period of extended operation because corrosion could lead to unacceptable degradation of the pressure boundary.

3.5.3.2.2 AGING MANAGEMENT PROGRAMS

The aging effect of concern for carbon steel and stainless steel components within the Oconee SSF Fuel Oil System is loss of material. The Oconee Chemistry Program and the Oconee Inservice Inspection Program will be used to manage the effects of aging for carbon steel and stainless steel components within the SSF Fuel Oil System during the period of extended operation. The demonstration of the effectiveness of these programs is provided in Section 3.5.8.

In addition to the above two programs, visual inspections of the SSF Day Tank and Fuel Oil Storage Tank will be conducted under the new SSF Fuel Oil Tank Inspection Program.

For the purposes of this example, this inspection is considered to be a new inspection.

This new inspection program is described in Section 3.5.9 and will not only be used to determine the functionality of the tanks, but will also serve to validate the effectiveness of the SSF Fuel Oil surveillances throughout the SSF Fuel Oil System. Because of the near-stagnant conditions and entry point of water and biological activity, these tanks are expected to be leading indicators of component degradation in the unlikely event the SSF Fuel Oil surveillances were to become ineffective.

For bolted closures, ...

For external surfaces, ...

3.5.3.3 TLAA

No time-limited aging analyses associated with oil and fuel oil systems were identified.

3.5.4 AGING MANAGEMENT REVIEW OF MECHANICAL COMPONENTS IN RAW WATER SYSTEMS

3.5.5 AGING MANAGEMENT REVIEW OF MECHANICAL COMPONENTS IN TREATED WATER SYSTEMS

3.5.6 AGING MANAGEMENT REVIEW OF MECHANICAL COMPONENTS IN VENTILATION SYSTEMS

3.5.7 HEAT EXCHANGERS

3.5.7.1 Borated Water Heat Exchangers

3.5.7.1.1 APPLICABLE AGING EFFECTS

3.5.7.1.2 AGING MANAGEMENT PROGRAMS

3.5.7.2 Oil Heat Exchangers

3.5.7.2.1 APPLICABLE AGING EFFECTS

3.5.7.2.2 AGING MANAGEMENT PROGRAMS

3.5.7.3 Raw Water Heat Exchangers

3.5.7.3.1 APPLICABLE AGING EFFECTS

3.5.7.3.2 AGING MANAGEMENT PROGRAMS

3.5.7.4 Treated Water Heat Exchangers

3.5.7.4.1 APPLICABLE AGING EFFECTS

3.5.7.4.2 AGING MANAGEMENT PROGRAMS

3.5.8 AGING MANAGEMENT PROGRAM DEMONSTRATIONS

3.5.8.1 Oconee Chemistry Program

Additional background information will be provided later.

For ease of review, the Oconee Chemistry Program, as presented in the Oconee Chemistry Section Manual, is being presented herein as four chemistry surveillance areas as further described in the following.

3.5.8.1.1 PRIMARY SYSTEM

Later

3.5.8.1.2 SECONDARY SYSTEM

Later

3.5.8.1.3 TREATED WATER

Later

3.5.8.1.4 SSF FUEL OIL

Carbon steel and stainless steel components can experience loss of material when exposed to fuel oil contaminated with water and/or bacterial/fungal activity. The intent of the Oconee SSF Fuel Oil surveillances are to ensure that SSF fuel oil does not contain contaminants which will introduce conditions that could be detrimental to the components in fuel oil systems. The surveillances place emphasis on the detection of water and bacterial/fungal activity in fuel oil with the purpose of minimizing the potential for loss of material in carbon steel and stainless steel components. The following discussion describes the necessary elements required to demonstrate that the loss of

material in carbon and stainless steel components in fuel oil is mitigated by the Oconee SSF Fuel Oil surveillances.

The SSF Fuel Oil System is included within the scope of the Oconee SSF Fuel Oil surveillances. All components which have been identified as being subject to an aging management review are exposed to fuel oil in this system. Therefore, the scope of the quarterly sampling and analysis performed by the Oconee SSF Fuel Oil surveillances covers all subject components in the SSF Fuel Oil System. The quarterly frequency is considered to be reasonable based on industry operating experience [Reference 1, SR 3.10.1.8 Bases] as well as Oconee specific experience.

The SSF Fuel Oil surveillances sample and analyze on-site fuel oil supplies for the presence of water and bacterial/fungal activity. The specific requirements of the surveillances include quarterly sampling and analysis of fuel oil supplies to ensure that the water content is less than 0.05 percent by volume and that bacterial/fungus contamination is less than 1x10E-10 gm ATP/ml. The parameters monitored and acceptance criteria established are consistent with those provided in ASTM D975 [Reference 2] and provide reasonable assurance that loss of material is minimized in carbon steel and stainless steel components exposed to fuel oil internal environments.

The Oconee SSF Fuel Oil surveillances are controlled by the Oconee Chemistry Section Manual and implemented by Chemistry procedures which are controlled by the Oconee Administrative Controls Program as further described in Section 3.2.5. The guidance stated in the Oconee Chemistry Section Manual is governed by Oconee Technical Specifications [Reference 3, ITS SR 3.10.1.8] that require that the water content in fuel oil be verified below 0.05 percent by volume on a quarterly basis. If this value is exceeded, the Technical Specification requires that the water content be returned to acceptable levels within seven days to avoid plant shutdown. The Oconee Chemistry Section Manual requires that Operations staff be notified in the event that bacterial/fungal levels are out of specification. Procedural guidance exists for the addition of biocide to return bacterial/fungal activity to acceptable levels in the event the levels are out of specification. Additionally, new fuel oil deliveries are treated with a biocide and sampled and analyzed for water content.

A review of available sample results for water contamination and bacterial/fungal activity in the SSF Fuel Oil System indicate values well below acceptance criteria. Water content levels have been 0.00 percent by volume during this time period. Bacterial/fungal activity shows scattered results with no recognizable trend. Responsible Chemistry personnel cannot recall any instances of exceeding the acceptance values for either water or bacterial/fungal activity since the SSF Fuel Oil System became operational in 1982.

Based on the above review, the SSF Fuel Oil surveillances provide reasonable assurance that the SSF fuel oil does not contain contaminants which will introduce conditions that could be detrimental to the components in fuel oil systems. The SSF Fuel Oil surveillances, in conjunction with the Inservice Inspection Program and the SSF Fuel Oil

Tank Inspection Program, provide reasonable assurance that the loss of material of the pressure boundary of SSF Fuel Oil System will be managed such that the component intended functions will be maintained for the period of extended operation.

3.5.8.2 Oconee Inservice Inspection Program

The NRC periodically amends 10 CFR Part 50.55a [Reference 4] to incorporate by reference an edition and applicable Addenda of the ASME Boiler and Pressure Vessel Code, Section XI, with specified modifications and limitations. Throughout the service life of nuclear power plants, components which are classified as ASME Code Class 2 or 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of editions of the ASME Code and Addenda that are incorporated by reference in §50.55a(b). These requirements are subject to the limitations and modifications described in §50.55a and to the extent practical within the limitations of design, geometry and materials of construction of the components [Reference 4, ¶ (g)(4)].

Inservice examination of components and system pressure tests conducted during successive 120-month inspection intervals, following the initial 120-month inservice inspection interval, must comply with the requirements of the latest edition and Addenda of the Code incorporated by reference in §50.55a(b) twelve months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed in paragraph §50.55a(b) [Reference 4, ¶(g)(4)(ii)]. The renewal license period of extended operation for Oconee will contain the fifth and sixth inservice inspection intervals. The Oconee inservice inspection program for each inservice inspection interval of the renewal license period of extended operation for Oconee will comply with §50.55a(g)(4)(ii) except that if an examination required by the Code or Addenda is determined to be impractical, then a relief request will be submitted to the Commission in accordance with the requirements contained in §50.55a(5)(iv), for Commission evaluation, as required by §50.55a(6)(i).

The requirements for ASME Class 2 components are contained in Subsection IWC - *Requirements for Class 2 Components of Light-Water Cooled Power Plants*; and for ASME Class 3 components, the requirements are contained in Subsection IWD - *Requirements for Class 3 Components of Light-Water Cooled Power Plants.*

The ASME Code Section XI requirements for inservice inspection of ASME Code Class 2 components are shown in Table IWC 2500-1 of the Code. The Examination Categories defined in Table IWC 2500-1 require the use of nondestructive examination (NDE) techniques to detect and characterize flaws. The extent and frequency of inspection are specified in Table IWC 2500-1. The inspection intervals are not restricted by the Code to the current term of operation and are valid for any period of extended operation. Three different types of examination are required: volumetric, surface, and visual examinations. Volumetric examinations are the most extensive, using methodologies such radiographic, ultrasonic or eddy current examinations to locate

surface and sub-surface flaws. Surface examinations use methodologies such as magnetic particle or dye penetrant testing to locate surface flaws.

The ASME Code Section XI requirements for inservice inspection of ASME Code Class 3 components are shown in Table IWD 2500-1 of the Code. The Examination Categories defined in Table IWD 2500-1 require the use of visual inspections - VT-2 and VT-3. The extent and frequency of inspection are specified in Table IWD 2500-1. The inspection intervals are not restricted by the Code to the current term of operation and are valid for any period of extended operation.

Three levels of visual examinations are specified in ASME Section XI: VT-1, VT-2, and VT-3. The VT-1 visual examination is conducted to assess the condition of the surface part being examined, looking for cracks and symptoms of wear, corrosion, erosion or physical damage. It can be done with either direct visual observation or with remote examination using various optical/video devices. The VT-2 examination is conducted specifically to locate evidence of leakage from pressure retaining components. Visual examinations are made looking for direct or indirect indications of leakage while the system is under pressure. VT-2 can either involve direct observation of uninsulated components or indirect indication of surrounding areas for inaccessible or insulated areas. Insulation, however, must be removed for pressure retaining bolted connections containing borated coolant. The VT-3 examination is conducted to determine the general mechanical and structural condition of components and supports and to detect discontinuities and imperfections, such as loss of integrity at bolted connections.

Piping components within the scope of ASME Code, Section XI may have been originally installed in areas that are now inaccessible for maintenance and inspection. Though a conscious effort was made during original design and construction to make piping locations requiring inservice inspection accessible, competing design requirements meant it was not always achievable to do so. For those limited instances where an inaccessible piping component requiring inspection does exist, provisions are provided in ASME Code, Section XI. Under the philosophy of ASME Code Section XI, programmatic oversight of piping components does imply 100% direct coverage of all components within a system. Rather, provisions are made under 10 CFR Part 50.55a and ASME Code Section XI to programmatically deal with those inaccessible locations that will require indirect assurance of integrity. Indirect assurance comes in the form of NRC approved code relief, use of statistical sampling methods, and use of indirect symptomatic evidence.

ASME Code Section XI, which has been developed by and will continue to be maintained through the consensus process of the Code, is expected to be effective in managing the identified effects of aging of ASME Code Class 2 and 3 mechanical components. In addition, the Commission's process of reviewing Editions and Addenda of the ASME Boiler and Pressure Vessel Code, and incorporating them into §50.55a with limitations and modifications as required, provides reasonable assurance that required activities will adequately manage the aging effects applicable to ASME Code

Class 2 and 3 mechanical components throughout the service life of nuclear power plants such that the current licensing basis will maintained.

The Oconee Inservice Inspection Plan [Reference 5] is maintained and implemented in accordance with the requirements of 10 CFR, §50.55a. The license renewal period of extended operation will encompass the fifth and sixth inservice inspection intervals for Oconee. If the renewal license is granted for Oconee, the plan for the fifth and sixth inservice inspection intervals will be submitted approximately one to two years prior to the beginning of each interval. These plans will provide, in concert with other activities described in this report, reasonable assurance that the ASME Code Class 2 and 3 mechanical components will be managed such that the component intended functions will be maintained consistent with the current licensing basis for the renewal license period of extended operation.

The following section provides additional Inservice Inspection Plan information specific to the SSF Fuel Oil System.

3.5.8.2.1 SSF FUEL OIL SYSTEM ISI

One of the purposes of the Oconee Inservice Inspection (ISI) Program is to verify the structural integrity of the equivalent ASME Section III Code Class 1, 2, and 3 components at Oconee. This verification is done in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda. The SSF Fuel Oil System is designed to ASME Section III, Class 3. For Class 3 components, these regulations require that a visual examination (VT-2) of components and system pressure tests be conducted once per inspection period, and a visual examination (VT-2) and hydrostatic test be conducted once per 10-year inspection interval. All the mechanical components of the SSF Fuel Oil System within the license renewal evaluation boundaries that require an aging management review are within the scope of ISI program.

The aging effect of concern is loss of material of the pressure boundary which could result in not maintaining sufficient flow at an adequate pressure in the SSF Fuel Oil System under design conditions. The purpose of a VT-2 examination is to locate evidence of leakage from pressure retaining components. This is accomplished with visual examinations that look for direct or indirect indications of leakage while the system is under pressure. Any leakage detected requires timely corrective action.

Duke Power submitted Relief Request 94-08 [Reference 6] to replace the visual examinations, system pressure tests, and hydrostatic tests required by ASME Code Section XI with testing/examinations to be conducted during routine monthly and quarterly testing and operation of the system by Operations personnel. The NRC approved Relief Request 94-08 [Reference 7] allowing Oconee to take advantage of the Technical Specification testing requirements for this system in lieu of the less stringent requirements of the ISI Program. Monthly and quarterly testing provides ample

opportunity to detect degradation of the SSF Fuel Oil System before a loss of system intended function occurs.

The SSF diesels are operated frequently for periodic surveillances. Technical Specifications require that the SSF diesels be operated unloaded on a monthly basis and run under load for 60 minutes each quarter. During these evolutions, procedures require Operations personnel to verify the fuel oil inventory and to check for evidence of leakage from the system. Also, on a quarterly basis, the SSF Fuel Oil Transfer Pump is run, transferring oil from the SSF Fuel Oil Storage Tank to the SSF Fuel Oil Day Tank. The combination of the portions of the fuel oil system needed to run the diesels and the portions needed to transfer fuel oil to the day tank comprise all of the components of the Fuel Oil System needed to perform the component intended function to maintain pressure boundary.

If there is an unaccounted change in fuel oil inventory of more than 500 gallons, approximately one percent of the tank capacity, or if there is evidence of any fuel oil leakage in the system, the situation is reported and evaluated. Any amount of leakage poses a fire hazard that must be corrected.

If any leakage is detected during testing of the system, the Oconee Corrective Actions Program governs the specific actions to be taken. Procedurally, Operations staff is notified if any leakage is detected in the system. Because this testing is performed to meet the requirements of the ISI Program, repairs and/or replacements are governed by IWA-5250 which requires the repair or replacement of leaking components. In addition, loss of fuel oil inventory in excess of 1% of tank capacity (500 gallons) requires notification of South Carolina Department of Health and Environmental Control. Within 72 hours after a release has been identified, Duke Power must perform the following:

- Report the release to the South Carolina Department of Health and Environmental and Control,
- Take immediate action to prevent any further release of the fuel oil into the environment, and
- Identify and mitigate fire, explosion, and vapor hazards.

The corrective action plan must be approved by the South Carolina Department of Health and Environmental Control.

Inspections and testing conducted via the Oconee ISI Program has been effective in managing loss of material as an applicable aging effect in the SSF Diesel Generator Fuel Oil System. Additionally, no leakage due to loss of material has been detected; therefore, leakage trending has not been necessary.

The Oconee ISI program is implemented by Oconee procedures which are controlled by the Oconee Administrative Controls program as further described in Section 3.2.5. The performance of these procedures is required by the Oconee Technical Specifications.

Carbon steel and stainless steel components which contain fuel oil can experience loss of material when exposed to water and/or bacterial/fungal activity. The SSF Fuel Oil System has carbon steel and stainless steel components which contain fuel oil; therefore, these components may experience loss of material if they are exposed to water and/or bacterial/fungal activity. No loss of material due to corrosion or biological activity has been detected by the ISI Program. All SSF Fuel Oil System components subject to an aging management review are within the scope of the ISI Program; therefore, the ISI Program is an acceptable program for managing loss of material as an aging effect for subject components in this system.

3.5.8.3 Oconee Maintenance Program

Later

3.5.9 ADDITIONAL INSPECTIONS FOR LICENSE RENEWAL

3.5.9.1.1 SSF FUEL OIL TANK INSPECTIONS

Loss of material due to corrosion in carbon steel fuel oil tanks exposed to moist air is an applicable aging effect that is not adequately managed by an existing plant program though some previous inspections revealed no evidence of any structural concerns. These inspections were not adequately documented. Therefore, a more formal SSF Fuel Oil Tank Inspection Program will be implemented to visually inspect the interior surfaces of the two tanks in the Standby Shutdown Facility (SSF) Fuel Oil System - the SSF Fuel Oil Storage Tank and the SSF Fuel Oil Day Tank - for corrosion and other surface irregularities.

The initial SSF Fuel Oil Tank Inspection will occur during the fourth Inservice Inspection Interval of Oconee Unit 1, currently expected to start in July 2003. Subsequent inspections will be based on the results of the first inspection but no later than ten years after the preceding inspection.

The interior surfaces of each of the two tanks will be visually inspected for evidence of discoloration, pitting, excessive corrosion, surface discontinuities, and other signs of surface irregularities that indicate a loss of material. A minimum of 90% of the internal surface area of each tank will inspected, with particular attention to dissimilar metal interfaces, welds, heat affected zones, and the bottom of the tanks where water and biological activity are likely to collect and create an environment that could cause corrosion of the carbon steel.

Inspected areas that are suspect will be found acceptable by engineering evaluation or corrected by repair or replacement. Additional inspections of the tanks and/or repair or

replacement of the tanks may be required based on an analysis of the inspection results. The determination of specific corrective actions, including whether or not additional inspections are warranted for either of these two tanks, will be made using the Corrective Action Program described in Section 3.2.4.

This inspection program will be implemented by plant procedure and controlled by the Oconee Administrative Controls Program as further described in Section 3.2.5.

The inspection of the fuel oil tanks by this SSF Fuel Oil Tank Inspection Program will provide reasonable assurance that the pressure boundary of the tanks will remain intact for the period of extended operation. In addition, the performance of the SSF Fuel Oil Tank inspection will confirm the effectiveness of the Chemistry Program in precluding loss of material in the fuel oil portions of the system and allow corrections to the Chemistry Program before loss of component intended function.

3.5.10 TIME - LIMITED AGING ANALYSES - FATIGUE OF NON-CLASS 1 COMPONENTS

The analyses and calculations that have been determined to be time-limited aging analyses have been previously identified in Table 1.4-1, Section 1.4 of this report. For these Oconee time-limited aging analyses, 10 CFR Part 54, §54.21(c) requires a demonstration that either:

(a) the analyses remain valid for the period of extended operation;
(b) the analyses have been projected to the end of the period of extended operation; or
(c) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

For mechanical systems within the scope of this section of OLRP-1001, the only time-limited aging analysis that has been identified associated with non-Class 1 mechanical systems is thermal fatigue of the pressurizer sample line.

As background, Oconee has several systems that were designed to USAS B31.7 Class II and Class III and to USAS B31.1.0 requirements [Reference 8, Table 3-1]. Piping systems designed to these requirements include stress reduction factors to provided conservatism in the design to account for cyclic conditions due to operations. The applied factor is 1.0 as long as the location does not exceed 7000 full temperature thermal cycles during its operation.

Thermal fatigue of non-Class 1 mechanical systems is considered to be a time-limited aging analysis because all six of the criteria contained in 10 CFR Part 54.3 are satisfied. Thermal fatigue is considered to be an effect of aging and involves time-limited assumptions defined by the current term (e.g., 7000 cycles). Thermal fatigue is relevant in making a safety determination and involves conclusions related to the capability of the component to perform its intended function (e.g., maintain the pressure boundary so that

sufficient flow and adequate pressure is delivered under design loads). The mechanical system design requirements are contained in the applicable design Code of Record which is given in the Oconee UFSAR [Reference 8] and are thus considered to be part of the current licensing basis. Finally thermal fatigue does involve a portion of a system within the scope of license renewal - pressurizer sample line. The following is a brief description of the process that was used to identify this location of interest.

In order to identify the specific locations were thermal fatigue could occur, an engineering review process was developed that considered the design temperatures and operating conditions of Oconee non-Class 1 mechanical systems. These mechanical systems were reviewed to determine which ones would be likely to see 7000 equivalent full temperature thermal cycles during plant operations. Based on this engineering review, the pressurizer sample line has been determined to be the only line within the scope of license renewal that may exceed 7000 thermal cycles in 60 years. The pipe supports for the pressurizer sample line of each Oconee unit have been modified to assure compliance with Code requirements for 60 years. Completion of this plant modification provides reasonable assurance that the effects of aging on the pressurizer sample line will be adequately managed for the period of extended operation.

3.5.11 Summary and Conclusions

To be provided later

3.5.12 References

1. NUREG-1430, "Standard Technical Specifications for Babcock and Wilcox Plants," Revision 1, NRC, April 1995.

2. D975-94, "Standard Specification for Diesel Fuel Oils", *Annual Book of ASTM Standards,* 1996.

3. Oconee Technical Specifications, as revised.

4. 10 CFR Part 50, §50.55a, *Codes and Standards.*

5. Oconee Nuclear Station, Inservice Inspection Plan, as revised.

6. J. W. Hampton (Duke) letter dated September 6, 1994 to Document Control Desk (NRC), Docket No. 50-269, Relief Request 94-08.

7. H. N. Berkow (NRC) letter dated January 31, 1995 to J. W. Hampton (Duke), Docket No. 50-269, Approval of Relief Request 94-08.

8. Oconee Updated Final Safety Analysis Report, as revised.