Safety Evaluation Report

with Open Items Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4

Docket Nos. 50-250 and 50-251

Florida Power & Light Company

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

August 2001

ABSTRACT

This document is a safety evaluation report regarding the application to renew the operating licenses for Turkey Point Units 3 and 4, which was filed by the Florida Power and Light Company by letter dated September 8, 2000 and received by the NRC on September 11, 2000. The Office of Nuclear Reactor Regulation has reviewed the Turkey Point Units 3 and 4, license renewal application for compliance with the requirements of Title 10 of the *Code of Federal Regulations*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared this report to document its findings.

In its submittal of September 8, 2000, the Florida Power and Light Company requested renewal of the Turkey Point, Units 3 and 4 operating licenses (License Nos. DPR-31 and DRP-41, respectively), which were issued under Section 104b of the (Atomic Energy Act of 1954, as amended, for a period of 20 years beyond the current license expiration dates of July 19, 2012 and April 10, 2013, respectively. The Turkey Point, Units 3 and 4 are located in Dade County in Florida City, Florida. Each unit consists of a Westinghouse pressurized-water reactor nuclear steam supply system designed to generate 2300 megawatts thermal, or approximately 693 megawatts electric.

The NRC Turkey Point Units 3 and 4 license renewal project manager is Rajender Auluck. Dr. Auluck may be contacted by calling 301-415-1025 or by writing to the License Renewal and Standardization Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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1. INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This document is a safety evaluation report (SER) on the application to renew the operating licenses for Turkey Point Units 3 and 4 filed by Florida Power and Light Company (hereafter referred to as FPL or the applicant).

By letter dated September 8, 2000, FPL submitted its application to the United States Nuclear Regulatory Commission (NRC) for renewal of the Turkey Point Units 3 and 4 licenses for an additional 20 years. The application was received by the NRC on September 11, 2000. The NRC staff reviewed the Turkey Point Units 3 and 4 license renewal application (LRA) for compliance with the requirements of Title 10 of the Code of Federal Regulations, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared this report to document its findings. The NRC license renewal project manager for the Turkey Point Units 3 and 4 is Rajender Auluck . Dr. Auluck may be contacted by calling (301) 415-1025 or by writing to the License Renewal and Standardization Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

In its application, the applicant requested renewal of the operating licenses issued under Section 104b of the Atomic Energy Act of 1954, as amended, for Turkey Point Units 3 and 4 (License Nos. DPR-31 and DPR-41) for a period of 20 years beyond the current license expiration dates of July 19, 2012; and April 10, 2013, respectively. The Turkey Point, Units 3 and 4 are located in Dade County in Florida City, Florida. Each unit consists of a Westinghouse pressuirzed-water reactor nuclear steam supply system designed to generate 2300 megawatts thermal, or approximately 693 megawatt electric. Details concerning the plant and the site are found in the updated final safety analysis report (UFSAR) for Turkey Point Units 3 and 4.

The license renewal process proceeds along two tracks: a technical review of safety issues and an environmental review. The requirements for these two reviews are stated in NRC regulations 10 CFR Parts 54 and 51, respectively. The safety review is based on FPL's application for license renewal and on the applicant's answers to requests for additional information (RAIs) from the NRC staff. In meetings and docketed correspondence, FPL has also supplemented its answers to the RAIs The public can review the LRA, and all pertinent information and material, including the UFSAR, at the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD 20852-2738. In addition, the Turkey Point, Units 3 and 4 LRA and significant information and material related to the license renewal review are available on the NRC Web page at www.nrc.gov.

This SER summarizes the findings of the staff's safety review of the Turkey Point Units 3 and 4 LRA and describes the technical details considered in evaluating the safety aspects of its proposed operation for an additional 20 years beyond the term of the current operating license. The staff reviewed the LRA in accordance with the NRC regulations and the guidance presented in the NRC draft "Standard Review Plan (SRP) for the Review of License Renewal Applications for Nuclear Power Plants," dated August 2000. The revised SRP was issued as NUREG-1800 in July 2001.

Chapters 2 through 4 of the SER address the staff's review and evaluation of license renewal issues that have been considered during the review of the application. Chapter 5 is reserved for the report of the Advisory Committee on Reactor Safeguards (ACRS). The conclusions of this report are in Chapter 6.

Appendix A is a chronology of NRC's and the applicant's principal correspondence related to the review of the application. Appendix B is a bibliography of the documents used during the review. Appendix C is a list of abbreviations used in the report. The NRC staff's principal reviewers for this project are listed in Appendix D.

In accordance with 10 CFR Part 51, the staff prepared a draft plant-specific supplement to the generic environmental impact statement (GEIS) that discusses the environmental considerations related to renewing the licenses for Turkey Point Units 3 and 4. The draft plant-specific supplement to the GEIS was issued separately from this report. Specifically, NUREG-1437 Supplement 5, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Turkey Point "Units 3 and 4", dated June 12, 2001, is the draft environmental impact statement for Turkey Point Units 3 and 4.

1.2 License Renewal Background

Pursuant to the Atomic Energy Act of 1954, as amended, and NRC regulations, licenses for commercial power reactors to operate are issued for 40 years. These licenses can be renewed for up to 20 additional years. The original 40-year license term was selected on the basis of economic and antitrust considerations, not by technical limitations. However, some individual plant and equipment designs may have been engineered on the basis of an expected 40-year service life.

In 1982, the NRC anticipated interest in license renewal and held a workshop on nuclear power plant aging. That led the NRC to establish a comprehensive program plan for nuclear plant aging research (NPAR). On the basis of the results of that research, a technical review group concluded that many aging phenomena are readily manageable and do not involve technical issues that would preclude extending the life of nuclear power plants.

In 1986, the NRC published a request for comment on a policy statement that would address major policy, technical, and procedural issues related to life extension for nuclear power plants.

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

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

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

1.2.1 Safety Reviews

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

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

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

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

Pursuant to 10 CFR 54.21(a), the applicant must review all SSCs that are within the scope of the rule to identify SCs that are subject to an aging management review (AMR). SCs that are subject to an AMR are those that perform an intended function without moving parts, or without a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period. As required by 10 CFR 54.21(a), the applicant must demonstrate that the effects of aging will be managed in such a way that the intended function or functions of the SCs that are within the scope of license renewal will be maintained, consistent with the current licensing basis, for the period of extended operation.

Active equipment, however, is considered to be adequately monitored and maintained by existing programs. In other words, the detrimental effects of aging that may occur for active equipment are more readily detectable and will be identified and corrected through routine surveillance, performance indicators, and maintenance. The surveillance and maintenance

programs and activities for active equipment, as well as other aspects of maintaining the plant design and licensing basis, are required to continue throughout the period of extended operation.

Pursuant to 10 CFR 54.21(d), each application is required to include a supplement to the FSAR. This supplement must contain a summary description of the programs and activities for managing the effects of aging.

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

In July 2001, the NRC issued a Regulatory Guide 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating License"; NUREG-1800, "Standard Review Plan for the Review of License Renewal Application for Nuclear Power Plants" (SRP-LR); and NUREG-1801, "Generic Aging Lessons Learned (GALL) Report." These documents describe methods acceptable to the NRC staff for implementing the license renewal rule, as well as techniques used by the NRC staff in evaluating applications for license renewals. The draft versions of these documents were issued for public comment on August 31, 2000 (64 FR 53047). The staff assessment of public comments is being issued as NUREG-1739, "Analysis of Public Comments on the improved License Renewal Guidance Documents." The regulatory guide endorsed an implementation guideline prepared by the Nuclear Energy Institute (NEI) as an acceptable method of implementing the license renewal rule. The NEI guideline is NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54–The License Renewal Rule," issued in March 1996. The regulatory guide will be used, along with the SRP, to review this application and to assess topical reports involved in license renewal as submitted by industry groups. As experience is gained, the NRC will improve the SRP and clarify the regulatory guidance.

1.2.2 Environmental Reviews

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

In accordance with NEPA and the requirements of 10 CFR Part 51, the NRC performs a plant-specific review of the environmental impacts of license renewal, including whether there is new and significant information not considered in the GEIS. A public meeting was held on December 6, 2000, near Turkey Point, Units 3 and 4 as part of the NRC's scoping process to identify environmental issues specific to the plant. The results of the environmental review process and a preliminary recommendation on the license renewal action were documented in NRC's draft plant-specific Supplement 5 to the GEIS, issued on June 12, 2001. On July 17, 2001, (during the 75-day comment period for the draft plant-specific Supplement to the GEIS) another public meeting was held near the site. At this meeting, the staff described the environmental review process and answered questions from members of the public to assist them in formulating any comments they might have regarding the review.

Supplement 5 presents the NRC's preliminary environmental analysis associated with renewal of the Turkey Point Units 3 and 4 operating licenses for an additional 20 years that considers and weighs the environmental effects, and alternatives available for avoiding adverse environmental effects.

On the basis of (1) the analysis and findings in the "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," NUREG-1437; (2) the Environmental Report submitted by the applicant; (3) consultation with other Federal, State, and local agencies; (4) its own independent review; and (5) its consideration of public comments received during the scoping period, the staff made a preliminary recommendation in draft Supplement 5 to NUREG-1437 that the Commission determine that the adverse environmental impacts are not so great that preserving the option of license renewal for energy planning would be unreasonable.

1.3 Summary of Principal Review Matters

The requirements for renewing operating licenses for nuclear power plants are described in 10 CFR Part 54. The staff performed its technical review of the Turkey Point Units 3 and 4 application for license renewal in accordance with Commission guidance and the requirements of 10 CFR 54.19, 54.21, 54.22, 54.23, and 54.25. The standards for renewing a license are contained in 10 CFR 54.29.

In 10 CFR 54.19(a), the Commission requires a license renewal applicant to submit general information. FPL submitted this general information in an Enclosure to its September 8, 2000, letter regarding the application for a renewed operating license for the Turkey Point Units 3 and 4. The staff reviewed that enclosure and found that the applicant submitted the information required by 10 CFR 54.19(a).

In 10 CFR 54.19(b), the Commission requires that LRAs include "conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The applicant states the following in its renewal application regarding this issue:

> The current indemnity agreement for Turkey Point, Units 3 and 4 states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement. Item 3 of the Attachment to the indemnity agreement, as revised by Amendment No. 5, lists four license numbers. FPL requested that conforming changes be made to Article VII of the indemnity agreement, and/or Item 3 of the Attachment to that agreement, specifying the extension of agreement until the expiration dates of the renewed FPL operating licenses as set forth in this Application. Thus, license number DPR-31 would be extended to expire at midnight, July 19, 2032, and DPR-41 would be extended to expire at midnight April 10, 2033. In addition, should the license number be changed upon issuance of the renewed licenses, FPL requests that conforming changes be made to Item 3 of the Attachment, and any other section of the indemnity agreement as appropriate.

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

In 10 CFR 54.21, the Commission requires that each application for a renewed license for a nuclear facility must contain the following information: (a) an integrated plant assessment (IPA), (b) current licensing basis changes during NRC review of the application, (c) an evaluation of time-limited aging analyses (TLAAs), and (d) a final safety analysis report (FSAR) supplement. On September 8, 2000, the applicant submitted the information required by 10 CFR 54.21(a) and (c) in the Enclosure of its LRA. Enclosure is titled "Application for Renewed Operating Licenses, Turkey Point Units 3 and 4."

In 10 CFR 54.22, the Commission states requirements regarding technical specifications. The applicant did not request any changes to the plant technical specification in its LRA.

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

The staff's evaluation of the environmental information required by 10 CFR 54.23 is documented in the draft plant-specific supplement to the GEIS (NUREG-1437, Supplement 5), that state the considerations related to renewing the licenses for Turkey Point Units 3 and 4.

1.3.1 Westinghouse Topical Reports

Turkey Point actively participated in a Westinghouse Owners Group (WOG) effort that developed a series of generic technical reports whose purpose was to demonstrate that the aging effects for Reactor Coolant System components are adequately managed for the period of extended operation. The following generic technical reports, applicable to Westinghouse Reactor Coolant Systems, have been submitted to the NRC for approval by Westinghouse:

- WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation of Class 1 Piping and Associated Pressure Boundary Components." Final NRC Safety Evaluation dated November 8, 2000 has been issued.

- WCAP-14574, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers." Final NRC Safety Evaluation dated October 26, 2000 has been issued.

- WCAP-14577, "License Renewal Evaluation: Aging Management for Reactor Internals." Final NRC Safety Evaluation dated February 10, 2001 has been issued.

- WCAP-14422, "License Renewal Evaluation: Aging Management for Reactor Coolant System Supports." Final NRC Safety Evaluation dated November 17, 2000 has been issued.

The safety evaluations of the topical reports are intended to be stand-alone documents. An applicant incorporating the topical reports by reference into its LRA must ensure that the conditions of approval stated in the safety evaluations are met. These reports were not incorporated by reference in the Turkey Point LRA because, as of September 1, 2000 (at the time of preparation of the LRA), none had received a final safety evaluation. However, the LRA addresses the applicability of these reports to the associated components at Turkey Point. The staff's evaluation of how the topical reports as applied to Turkey Point Units 3 and 4 is found in Section 3.2 of this SER.

1.4 Summary of Open Items and Confirmatory Items

Open Item 2.1.2-1 The staff has reviewed and disagrees with the applicant's scoping criteria for seismic II over I piping systems. The staff's position is that the seismic II over I piping systems whose failure could prevent safety related systems and structures from accomplishing their intended functions should be within the scope of license renewal in accordance with the scoping requirements 10 CFR 54.4(a)(2). For these Seismic II/I Piping systems, the applicant should perform an AMR to determine if there are any plausible aging effects, and identify appropiate aging management programs. The applicant needs to clarify the scope of its seismic II over I piping systems (i.e., whether it includes non-safety-related piping systems that are connected to safety related piping systems as well as non-safety-related piping systems that are not connected to safety-related piping systems). The applicant also needs to address the criteria used to postulate breaks and cracks in non-safety-related piping systems that are within the seismic II over I scope, if it wishes to take credit for protection of safety-related systems. The applicant must demonstrate that plant mitigative features which are provided to protect safety-related SSCs from a failure of non-safety-related piping systems are within the scope of license renewal.

Open Item 3.9.12-1 The reactor vessel head Alloy 600 penetration inspection program (RVHPIP) is designed to manage cracking in the Alloy 600 (VHPs) of the Turkey Point Units. In Section 3.2.12 of the LRA, the applicant did not specify whether it would continue to be a participant in the NEI program for managing primary water stress corrosion cracking (PWSCC) type aging in Alloy 600 reactor vessel head penetrations (VHPs) of U.S. pressurized water reactor (PWR) designed facilities, and whether the applicant would continue to use this program as the basis for evaluating the Alloy 600 VHPs in the Turkey Point nuclear units during

the proposed extended operating terms for the units. The scope of the RVHPIP described in Section 3.2.12 of Appendix B of the LRA needs to be updated to reflect that the applicant will continue to implement program for monitoring and controlling cracking in U.S. VHP nozzles during the period of extended operating term. This includes updating the RVHPIP to reflect the information and relative rankings for the Turkey Point units in Topical Report MRP-44 to make it consistent with NEI's current integrated program for evaluating Alloy 600 VHPs in U.S. PWRs.

Open Item 4.3-1 In Section 4.3 of the LRA, the applicant indicates that a generic evaluation of underclad cracks had been extended to 60 years using fracture mechanics evaluations based on a representative set of design transients with the occurrences extrapolated to cover 60 years of service.

The applicant further stated that the number of design cycles and transients assumed in the WCAP- 15338 analysis bounds the Turkey Point Units 3 and 4 design transients identified in UFSAR Table 4.1-8 and provided in Appendix A of the LRA. Therefore, the conclusions in the WCAP are applicable to Turkey Point reactor vessels. The Westinghouse Owners Group (WOG) has submitted for staff review topical report WCAP-15338, "A Review of Cracking Associated with Weld Deposited Cladding in Operating PWR Plants (MUHP-6110)." This report describes the fracture mechanics analysis that evaluates the impact of 60 years of operation on reactor vessel underclad crack growth and reactor vessel integrity. This report is under staff review. If as a result of this review, plant specific requirements are identified, the applicant will need to meet those plant specific requirements.

Open Item 3.8.4-1

a. The staff requests that the applicant provide the specific acceptance criteria for the one-time field erected tanks internal inspection. The acceptance criteria should clearly state the threshold at which additional inspections, beyond the one-time inspection, will be implemented. The staff requests this information so that we can determine whether the acceptance criteria support the detection and evaluation of the aging effect loss of material such that the intended functions will be maintained throughout the period of extended operation.

b. As part of the RAI 3.8.4-4, the applicant was asked to describe any provisions for additional volumetric or surface examinations in the event that the scheduled one-time visual examination reveals extensive loss of material. In response, the applicant stated that the lighting and resolution requirements necessary to accomplish the internal tank inspections have not yet been established but the inspection requirements will be documented in the implementing procedure. The program requirements will need to be resolved as part of this review. This is part of open item 3.8.4-1.

c. As part of RAI 3.8.4-1, the staff requested that the applicant justify a one-time inspection program rather than periodic inspections for each of the tanks. In response, the applicant stated that the condensate storage tanks (CSTs), the refueling water storage tanks (RWSTs), and demineralized water storage tank (DWST) are not currently inspected on a periodic basis. The Unit 4 CST was internally inspected and recoated in 1983. The Unit 3 CST was internally inspected, several $^{1}/_{16}$ inch pits were weld repaired, and the tank was recoated in 1991. The need for recoating activities was attributed to

operational practices and the original coatings being inadequate for the application, and both have been corrected. The applicant further stated that a review of plant specific operating experience revealed no other incidences of internal degradation for these tanks. Resolution of the uncertainty as to whether RWSTs and DWST are included in this statement is part of open item 3.8.4-1.

Confirmatory Item 3.0-1 The staff reviewed the applicant's summary descriptions of the aging management programs (AMPs), and the evaluations of the time-limited aging analyses (TLAAs) provided by the applicant in Appendix A, "Safety Analysis Report Supplement," of the LRA, to ensure that they are consistent with the requirements of 10 CFR 54.21(d). The staff identified several areas where the resolution of the open item or a commitment by the applicant needs to be included to meet the intent of 10 CFR 54.21(d). The additional information involved the following:

FSAR Item 3.1.2-1 The applicant has established and implemented a Quality Assurance Program to provide assurance that corrective actions, administrative controls, and confirmation process apply to all aging management programs credited for license renewal. The FPL Quality Assurance Program, described in the FPL Topical Quality Assurance Report, is in compliance with the requirements of 10 CFR 50, Appendix B.

FSAR Item 3.7-1 In response to the staff's RAI 3.7.1-1, the applicant has proposed an aging management program for non-EQ cables, connections, and electrical/I&C penetrations.

FSAR Item 4.2-1 Staff evaluation in Section 4.2.2 of the SER concludes that the summary description for the RCS TLAAs described in the LRA, Appendix A, are acceptable and meets the requirements of 10 CFR 54.21(d). However, as discussed, the applicant must apply the chemistry factor ratio adjustment described in RG 1.99, Rev. 2, Position 2.1, to the surveillance data when submitting the 48 EFPY P-T limits curves for review and approval. This adjustment is necessary to ensure an accurate assessment of the data.

FSAR Item 4.3-1

a. In response to RAI 4.3.5-5, the applicant committed to perform additional evaluation of the surge line. The applicant committed to either (1) further refinement of the fatigue analysis to lower the CUFs to below 1.0, or (2) repair of the affected locations, or (3) replacement of the affected locations, or (4) management of the effects of fatigue by an inspection program that has been reviewed and approved by the NRC.

b. In response to RAI 4.3.5-1, the applicant performed an evaluation of the RPV outlet nozzle and the RPV shell core support pads using the projected number of transient cycles. The applicant committed to either (1) modify the Turkey Point FMP to limit transient accumulations to those used in the above evaluations, (2) perform a more refined evaluation for the RPV outlet nozzle and RPV shell at the

core support pads to show acceptable CUF values for 60 years, or (3) track CUF values in addition to cycle counts to ensure CUF values remain acceptable.

c. In its response to RAI 4.3.1-4, the applicant used the actual projected number of transient cycles for the spray nozzle evaluation. The applicant committed to either (1) modify the Turkey Point FMP to limit transient accumulations to the values used in the spray nozzle evaluation, (2) perform a more refined evaluation for the spray nozzle to show an acceptable CUF for 60 years, or (3) track CUF values in addition to cycle counts to ensure that CUF values remain acceptable.

FSAR Item 3.8.4-1 The applicant's summary description for the field erected tanks internal inspection program is provided in Section 16.1.4 of Appendix A to the LRA, and provides an overview of the one-time inspection as described in Section 3.1.4 of Appendix B to the LRA. The FSAR supplement should be modified to reflect the applicant's response to the Open Item 3.8.4-1.

FSAR Items 3.9.2-1 A staff evaluation of applicant is Boroflex surveillance program is provided in Section 3.9-2 of this SER. The staff requests this applicant to update its UFSAR Supplement to include a description of Boroflex and the enhancements to the related maintenance programs.

Confirmatory Item 4.4.2-1 In response to the staff's concern regarding the wear cycle aging effect on motors, the applicant stated that the wear cycling is normally not the limiting factor in the qualified life of the equipment and is not discussed in the qualification package. The applicant further stated that a motor should be able to withstand 35000 to 50000 starts according to Volume 6 of the EPRI Power Plant Electrical Reference Series (page 6-46). Thus the wear cycle aging effect is considered insignificant for these motors. The applicant committed to revise the EQ documentation packages for Westinghouse and Joy motors to include a reference to Volume 6 of the EPRI Power Plant Electrical Reference Series (page 6-46). This will be tracked as confirmatory item 4.4.2-1.

2. Structures and Components Subject to an Aging Management Review

2.1 Scoping and Screening Methodology

This section describes the staff's evaluation of Section 2.1, "Scoping and Screening Methodology," of the LRA. The process used by the applicant to implement the requirements of 10 CFR 54.4(a) and (b) is summarized by the following steps and described in detail in Sections 2.2 through 2.5 of the Turkey Point LRA:

- Plant-Level Scoping: (a) scope systems at the plant level that meet the criteria of 10 CFR 54.4, and (b) identify intended functions of plant-level systems that are within the scope of the LRA.

- Component Scoping and Screening: (a) identify all components and structures used to perform the intended functions of the plant-level systems that are within the scope, and (b) screen each component and structure function to determine whether it meets any of the scoping criteria specified in 10 CFR 54.4(a).

10 CFR 54.21, "Contents of Application — Technical Information," requires, in part, that each application for license renewal must contain an integrated plant assessment (IPA) that identifies and lists those structures, systems, and components (SSCs) satisfying the scoping criteria in 10 CFR 54.4(a)(1), (a)(2), and (a)(3) that are subject to an aging management review (AMR). 10 CFR 54.4, "Scope," defines the criteria for inclusion of SSCs within the scope of 10 CFR Part 54.

As provided in 10 CFR 54.4(a)(1), design-basis events for license renewal are applied as defined in 10 CFR 50.49(b)(1), consistent with the applicant's current licensing basis (CLB). Section 54.4(b) provides that "the intended functions that these structures, systems, and components must be shown to fulfill in 10 CFR 54.21 are those functions that are the bases for including them within the scope of license renewal as specified in paragraphs (a)(1)-(3)" of 10 CFR 54.4.

The list of functions evaluated encompasses all plant systems and structures within scope. The functions did not necessarily follow traditional system boundaries, in that the functions included structures and components (SCs), irrespective of traditional system nomenclature, that perform or support the identified function. To arrive at the component level, the applicant identifies all components and structures that are used to perform the intended functions of the plant-level systems that are within the scope of license renewal. Each component and structure function was reviewed to determine whether it met any of the scoping criteria specified in 10 CFR 54.4(a)(1)-(3). The components and structures whose function met any scoping criteria were then reviewed for placement into an aging management program based on 10 CFR 54.21 screening requirements.

LRA Section 2.1.2, "Component/Structural Component Scoping and Screening," Identifies and lists the structures or components that are subject to an AMR for mechanical systems, civil structures, electrical, and instrumentation and control (I&C) systems.

2.1.1 Summary of Technical Information in the Application

Plant- Level Scoping

In LRA Section 2.1, "Scoping and Screening Methodology," the applicant described the process used to implement the scoping requirements specified in 10 CFR 54.21(a)(2). As used in the LRA, scoping is the process of identifying systems and structures that meet the scoping criteria of 10 CFR 54.4(a)(1) - (3), including the identification of intended functions as defined by 10 CFR 54.4(b) — those functions that are related to meeting one or more of the scoping criteria of 10 CFR 54.4(a)(1) — (3). The applicant's scoping criteria as applied to plant SSCs are:

- safety-related SSCs, including those responsible for reactor coolant pressure boundary integrity (10 CFR 54.4(a)(1)(i)), safe reactor shutdown and maintenance (10 CFR 54.4(a)(1)(ii)), and accident consequences prevention or mitigation (10 CFR 54.4(a)(1)(iii))

- non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions associated with safety-related items (10 CFR 54.4(a)(2))

- compliance with fire protection regulations (10 CFR 50.48 and 10 CFR 54.4(a)(3))

- compliance with environmental qualification regulations for electrical equipment (10 CFR 50.49) and (10 CFR 54.4(a)(3))

- compliance with pressurized thermal shock regulations (10 CFR 50.61 and 10 CFR 54.4(a)(3))

- compliance with anticipated transients without scram regulations (10 CFR 50.62 and 10 CFR 54.4(a)(3))

- compliance with station blackout regulations (10 CFR 50.63) and 10 CFR 54.4(a)(3))

Plant-Level Scoping Information Sources

In developing the scoping and screening methodology for the LRA, FPL considered the requirements of 10 CFR Part 54, the Statements of Consideration, and the guidance provided by the Nuclear Energy Institute (NEI) in document NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 1, (January 2000). In addition, the applicant considered NRC staff correspondence with other applicants and with NEI in developing its methodology.

The applicant performed a comprehensive review of design documents in order to create a list of plant-level SSCs. The applicant included information sources such as the Turkey Point Updated Final Safety Analysis Report (UFSAR), Technical Specifications, design-basis documents (18 systems), component database, and piping and instrumention drawings (P&IDs).

Plant-Level Safety-Related Systems and Structures Scoping

In 10 CFR 54.4(a)(1)(i) — (iii), the NRC describes the safety-related scoping criteria for determining SSCs that are within the scope of license renewal. The applicant reviewed each system and structure function in the plant listing of scoping results (LRA Tables 2.2-1, 2.2-2, and 2.2-3) with respect to these requirements by addressing the following questions:

- Is the system or structure identified as safety-related because it is relied upon during and following design-basis events to ensure the integrity of the reactor coolant pressure boundary?

- Is the system or structure identified as safety-related because it is relied upon during and following design-basis events to ensure the capability to shut down the reactor and maintain it in a safe shutdown condition?

- Is the system or structure identified as safety-related because it is relied upon during and following design-basis events to ensure the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in 10 CFR 100.11?

The applicant used its UFSAR, Technical Specifications, licensing correspondence, design-basis documents, component database, and design drawings to answer these questions. The applicant developed engineering documents to provide system-related design information. Also, the applicant used its UFSAR, Technical Specifications, and design-basis documents to provide function-related information. The applicant identified the plant's design-basis accidents in UFSAR Chapter 14. In addition, the applicant has described design-basis events related to natural phenomena and external events in Chapter 2 and Chapter 5 of its UFSAR. If the answer to one or more of the three questions was "YES," the corresponding system or structure was determined to be within the scope of license renewal and the intended function was specified as required by 10 CFR 54.4(b).

Plant-Level Non-Safety-Related Systems and Structures Scoping

In 10 CFR 54.4(a)(2), the NRC requires that "all non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii)" of § 54.4 are within the scope of license renewal. The applicant reviewed each system and structure in the plant listing of scoping results with respect to this requirement by addressing the following question:

- Can failure of the non-safety-related system or structure prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i)(ii), or (iii)?

If the answer was "YES," the corresponding system or structure was determined to be within the scope of license renewal and the intended function was specified as required by 10 CFR 54.4(b). The applicant used the UFSAR, Technical Specifications, licensing correspondence, design-basis documents, component database, pipe stress analyses, and design drawings to answer these questions. The applicant relied on the component database and design drawings to provide system-related design information. The applicant determined

the function-related information from its UFSAR, Technical Specifications, pipe stress analyses, and the design-basis documents. The applicant identified the basis for its design-basis events in Chapter 14 of the UFSAR and natural phenomena and external events in Chapters 2 and 5 of the UFSAR.

There are two categories for non-safety-related SSCs that are within the scope of license renewal for Turkey Point, Units 3 and 4:

- non-safety-related SSCs that functionally support the operation of safety-related SSCs
- non-safety-related SSCs whose failure could cause an interaction with safety-related SSCs and potentially result in the failure of the safety-related SSCs to perform their intended safety function(s)

Non-safety-related SSCs that functionally support the operation of safety-related SSCs are classified as "Quality Related" in the Turkey Point component database. Some of the systems in this category are non-safety-related ventilation systems and non-safety-related piping segments (pipes and supports) that provide structural support. These components are within the scope of license renewal. For most of the potential interactions, failure of the non-safety-related system or structure is assumed to occur and design features are provided to accommodate the failure by the applicant. Examples include internal flooding (protective design features: sump pumps and drainage), and internal missiles (protective design features: buildings, missile barriers, and enclosures). However, the applicant does not consider a non-safety-related piping segment that does not support a safety-related piping segment to be within the scope of license renewal. The applicant maintains that "seismic II over I" piping segments do not perform an intended function defined by 10 CFR 54.4(a)(2) and, therefore, the applicant does not consider the piping segments to be within the scope of license renewal.

Non-Safety-Related SSCs Flooding Interaction

The applicant describes the plant's internal flooding protection from postulated failures of non-safety-related piping in UFSAR, Chapter 5, Appendix 5F. The applicant reviewed the susceptibility of safety-related systems to flooding from failure of non-Category I (seismic) systems. The NRC staff concluded in a safety evaluation report dated September 4, 1979, that a sufficient level of protection from flooding for equipment important to safety was provided. The applicant maintains design features (i.e., curbing, platforms, sumps, and sump pumps) to mitigate the effects of flooding. These design features are within the scope of license renewal and identified in LRA Table 3.4.7, "Waste Disposal." Also, the applicant identified flooding design features in LRA Tables 3.6-2 through 3.6-20. However, the applicant does not include the non-safety-related piping segments within the scope of license renewal.

Non-Safety-Related SSCs Spray, Jet Impingement, and Pipe Whip Interaction

The applicant describes the plant's spray, jet impingement, and pipe whip protection from postulated failures of non-safety-related piping in UFSAR, Chapter 5, Section 4, "Pipe Whip Restraints." The applicant maintains design features (i.e., pipe whip restraints and internal barriers) to mitigate the effects of spray, jet impingement, and pipe whip. These design features are within the scope of license renewal and identified in LRA Table 3.6.2 through

3.6-20. However, the applicant does not include the non-safety-related piping segments within the scope of license renewal.

Non-Safety-Related SSCs Seismic Interaction

Systems or structures whose failure during a seismic event could cause the subsequent failure of a safety-related system or structure is commonly referred to as "seismic II over I" interaction. The applicant uses an area-based approach for seismic scoping. The area-based approach identifies the major SSCs of the plant within a specific area (i.e., a specific room, a floor of a building, or even all inside areas of an entire building) which contains both safety-related and non-safety-related systems and structures. Those SSCs are then further evaluated to determine potential interactions between those safety-related and non-safety-related SSCs. Component and structural component level scoping performed as part of the screening process then establishes the specific non-safety-related seismic interaction structural/component types located within these structures for inclusion in the license renewal scope. The steps in the "seismic II over I" process are as follows:

- Identify all major structures of the plant containing safety-related and non-safety-related SSCs.
- Perform component-level and structural component-level scoping.
- Establish the specific non-safety-related seismic interaction component and structural component types.

The applicant concluded that non-safety-related piping segments must be supported in a manner to prevent them from falling on safety-related components. Therefore, the applicant includes within the scope of license renewal the pipe supports that preclude non-safety-related piping from falling on safety-related components. However, the applicant does not include the non-safety-related piping segments within the scope of license renewal.

Systems and Structures Relied Upon to Demonstrate Compliance With Certain NRC Regulations

The applicant reviewed NRC safety evaluation reports (SERs) and related docketed correspondence associated with all five regulations identified in 10 CFR 54.4(a)(3). The applicant used this review to identify the set of system and structure functions credited with satisfying the requirements associated with those regulations from the complete set of system and structure functions established by the process described in LRA Section 2.1.1. The five regulations are as follows:

- 10 CFR 50.48, "Fire protection."
- 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants."
- 10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events."

- 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants."

- 10 CFR 50.63, "Loss of all alternating current power."

Each system and structure was reviewed with respect to these criteria by addressing the following questions:

- Is the system or structure relied upon in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulation for fire protection (10 CFR 50.48)?

- Is the system or structure relied upon in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulation for environmental qualification (10 CFR 50.49)?

- Is the system or structure relied upon in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulation for pressurized thermal shock (10 CFR 50.61)?

- Is the system or structure relied upon in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulation for ATWS events (10 CFR 50.62)?

- Is the system or structure relied upon in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulation for Station Blackout (10 CFR 50.63)?

The applicant used the UFSAR, licensing correspondence, design-basis documents, component databases, design drawings, Safe Shutdown Analysis, and the Essential Equipment List to identify the systems that are relied upon to comply with the Fire Protection Rule (10 CFR 50.48). In the Safe Shutdown Analysis, Section III.G.1, equipment required for safe shutdown, including the associated power and control cables, and equipment that could adversely affect safe shutdown if spuriously actuated by fire-induced faults, has been identified for every fire area in the plant. The applicant has defined in the Essential Equipment List the minimum equipment necessary to bring the plant to cold shutdown. Also, the applicant describes all power generation and distribution equipment (e.g., diesel generators, batteries, switchgear, motor control centers, power panels) that is required for the operation of the essential equipment. The applicant has listed equipment that could adversely affect safe shutdown if spuriously actuated by a fire-induced electrical fault in the Essential Equipment List. The non-safety-related SSCs that are relied on for fire protection carry an augmented quality classification (Quality Related). The applicant included the fire protection SSCs as part of the FPL Quality Assurance Program and described this equipment in Appendix 9.6A of the UFSAR. In accordance with 10 CFR 54.4(a)(3), the applicant has placed within the scope of license renewal the SSCs that are relied upon for fire protection. Also, the applicant has placed within the scope of license renewal the equipment that, although not required for safe shutdown, could adversely affect safe shutdown if spuriously actuated by a fire-induced electrical fault.

The applicant identified the systems relied upon to comply with the environmental qualification rule (10 CFR 50.49) by reviewing the UFSAR, Technical Specifications, licensing correspondence, design-basis documents, and the Environmental Qualification List. In the Environmental Qualification List, the applicant included the equipment required to withstand environmental conditions that may occur during or following a design-basis event per 10 CFR 50.49. The applicant listed in UFSAR Appendix 8A.3 the criteria for determining which equipment requires environmental qualifications. The applicant placed within the scope of license renewal per 10 CFR 54.4(a)(3), the SSCs that are relied upon and/or specifically committed to for environmental qualification.

The applicant placed the reactor vessel within the scope of license renewal as the only component relied upon for protection against pressurized thermal shock. The applicant has calculated the maximum nil ductility reference temperature (RT_{PTS}) for the lower shell, intermediate shell and circumferential weld of the reactor vessel as shown in LRA, Section 4.2.1, "Pressurized Thermal Shock." The applicant calculated the RT_{PTS} values for both Turkey Point reactor vessels at the end of the period of extended operation (48 effective full power years). The calculated RT_{PTS} values are less than the 10 CFR 50.61(b)(2) screening criteria. Therefore, the applicant has not performed additional modifications to equipment or systems to prevent potential failure of the reactor vessel. Since no new or modified SSCs were used for protection against pressurized thermal shock, the applicant placed the reactor vessel within the scope of license renewal as the only component relied upon for protection against pressurized thermal shock.

For the remaining questions, regarding station blackout and ATWS regulations, if the answer to any of the questions was "YES," then the corresponding system or structure was brought into scope and the functions were identified as an intended function per 10 CFR 54.4(b).

2.1.1.2 Component-Level Scoping and Screening

For each structure and component within the scope of Part 54, the applicant must demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained in a manner that is consistent with the CLB throughout the period of extended operation. The process described in LRA Sections 2.1.1.2, 2.1.1.3, and 2.1.1.4 was used to identify the Turkey Point "intended functions" for license renewal. 10 CFR 54.21(a) requires that each application must contain an integrated plant assessment (IPA). For those SSCs determined to be in scope per 10 CFR 54.4, the IPA must identify and list those SCs that are subject to an AMR. The integrated plant assessment process employed by the applicant required an initial review of those functions within the scope of license renewal, as determined by the process described in LRA Sections 2.1.1.2, 2.1.1.3, and 2.1.1.4, to define intended function evaluation boundaries. The intended function evaluation boundaries were then used to assist in the identification of the SCs that are subject to an AMR.

LRA Section 2.1.2 defines a component scoping and screening process whereby FPL identified and listed the SCs which met the criteria of 10 CFR 54.21(a)(1)(i) and (ii) and, therefore, require an AMR. Use of the term "passive" within the LRA is intended to be identical to criterion (i). That is, SCs that perform an intended function without moving parts or without a change in configuration or properties are characterized by the applicant as "passive." Likewise, as set forth in criterion (ii), SCs that are not subject to replacement based on a qualified life or specified time period are characterized by the applicant as "long-lived."

The component scoping and screening processes for SSCs at Turkey Point are categorized into three engineering disciplines, which are identified as: (1) mechanical, (2) civil/structural, and (3) electrical/I&C. The process for each discipline is described in LRA Sections 2.1.2.1, 2.1.2.2, and 2.1.2.3. The applicant's component scoping and screening approach for mechanical systems and civil structures in the area of consumables attempts to be consistent with the NRC staff's guidance provided in a March 10, 2000, letter to NEI on consumables. A bounding approach as described in NEI 95-10 is used for screening electrical and I&C systems. This approach completes component-level scoping after screening has been performed.

Mechanical System Scoping and Screening

The applicant performed component scoping and screening of the mechanical systems for Turkey Point in six steps:

1) Based on a review of design drawings and the system component list from the component database, SCs that are included within the system were identified.

2) Based on the plant-level scoping results, the pressure boundary associated with license renewal system intended functions was mapped onto the system's flow diagrams.

3) The SCs that are within the scope of license renewal (i.e., required to perform a license renewal system intended function) were identified.

4) Component intended functions for in-scope SCs were identified. Not all of the components for in-scope systems have in-scope intended functions. Consequently, not all components within an in-scope system are within the scope of license renewal.

5) The in-scope SCs that perform an intended function without moving parts or without a change in configuration or properties were identified.

6) The passive, in-scope SCs that are not subject to replacement based on a qualified life or specified time period were identified as requiring an AMR.

Civil Structures Screening

The applicant performed component scoping and screening of the civil structures for Turkey Point in six steps:

1) Based on a review of design drawings, the structure component list from the component database, and plant walkdowns, systems and components that are included within the structure were identified (i.e., walls, supports, cable trays, electrical enclosures, and instrument panels).

2) The systems and components that are within the scope of license renewal (i.e., required to perform a license renewal system intended function) were identified.

3) Design features and associated systems and components that prevent potential seismic interactions for in-scope structures housing both safety-related and non-safety-related systems were identified.

4) Component intended functions for in-scope systems and components were identified. Not all of the components for in-scope systems and structures have in-scope intended functions. Consequently, not all components are in the scope of license renewal.

5) The in-scope systems and components that perform an intended function without moving parts or without a change in configuration or properties were identified.

6) The passive, in-scope systems and components that are not subject to replacement based on a qualified life or specified time period were identified as requiring an AMR.

Electrical and I&C Systems Screening

The applicant performed component scoping/screening of the electrical and I&C structures for Turkey Point in five steps:

1) Electrical and I&C component commodity groups associated with electrical, I&C, and mechanical systems within the scope of license renewal were identified.

2) A description and function for each of the electrical and I&C component commodity groups were identified.

3) The electrical and I&C component commodity groups that perform an intended function without moving parts or without a change in configuration or properties were identified.

4) For the passive electrical and I&C component commodity groups, component commodity groups that are not subject to replacement based on a qualified life or specified time period were identified as requiring an AMR.

5) Certain passive, long-lived electrical and I&C component commodity groups that do not support license renewal system intended functions were identified as not requiring an AMR.

2.1.2 Staff Evaluation

The staff reviewed the methodology used by the applicant to identify SSCs at Turkey Point that meet the scoping criteria of 10 CFR 54.4, and to identify SCs that meet the screening criteria of 10 CFR 54.21(a)(1) and (2). The staff used Section 2.1, "Scoping and Screening Methodology," of the SRP to perform the scoping and screening review.

2.1.2.1 Turkey Point LRA Scoping and Screening Procedures Review Results

On November 13—16, 2000, the staff conducted an audit to determine whether the scoping and screening methodology described by the applicant in its LRA for Turkey Point was implemented consistent with the requirements of 10 CFR Part 54, and the Turkey Point LRA. The audit took place on site at the FPL offices in Florida City, Florida. The audit consisted of a review of the scoping and screening methodology implementing procedures used by the applicant to identify the SSCs within scope of the 10 CFR Part 54 and to designate the SCs

that are subject to an AMR for the period of extended operation. The results of the audit were documented in an audit report dated April 25, 2001.

During this audit, the staff reviewed the LRA related scoping and screening methodology. Supporting documents explain in detail the methods used for scoping and screening SSCs to determine which items are within the scope of license renewal. Also, the staff reviewed the screening process of the items within scope to determine if the SSCs are subject to an AMR. The staff observed that the scoping and screening process was conducted as described in the LRA.

The applicant developed ENG-QI 5.3 and ENG-QI 5.4 based on the NEI 95-10, Rev. 1, and Westinghouse Owners Group (WOG) "Generic License Renewal Guideline for Identifying Systems and Structures Within the Scope of 10 CFR Part 54, Revision 0," (February 1996). ENG-QI 5.3 provides guidance for identifying and documenting the systems and structures at FPL's nuclear plants that are within the scope of license renewal. As part of the scoping process, system and structure intended functions are also identified. First, the applicant identified all systems and structures at Turkey Point. Next, the applicant conducted evaluations to determine which plant systems and structures meet each criterion of 10 CFR 54.4. An alternate "area" scoping method is used for some non-safety-related structures or systems that could cause failures of safety-related structures or systems. The applicant chose an area-based approach to scoping because the seismic interaction design feature is dependent upon the location of the non-safety-related system or structure in relation to the location of safety-related SSCs. The area-based approach identifies the major SSCs of the plant within a specific area (i.e., a specific room, a floor of a building, or even all inside areas of an entire building) which contains both safety-related and non-safety-related systems and structures. Those SSCs are then further evaluated to determine potential interactions between those safety-related and non-safety-related SSCs. Component and structural component level scoping performed as part of the screening process then establishes the specific non-safety-related seismic interaction structural/component types located within these structures for inclusion in the license renewal scope.

The audit team reviewed the following implementation procedures:

- Nuclear Engineering Quality Instruction, ENG-QI 5.3, Revision 2, dated March 29, 1999, "License Renewal System/Structure Scoping," provides guidance for identifying and documenting the systems and structures that are within the scope of license renewal. As part of the scoping process, system and structure intended functions are also identified.

- ENG-QI 5.4, Revision 2, dated March 29, 1999, "License Renewal Screening," provides guidance for the screening of systems and structures that are within the scope of license renewal to identify those SCs that require aging management reviews. The systems and structures within the scope of license renewal rule are determined using ENG-QI 5.3.

- ENG-QI 5.5, Revision 4, dated April 21, 2000, "License Renewal Aging Management Review," provides guidance for performing AMRs as required by 10 CFR Part 54. In most cases, identification of all components and structures that require an AMR are identified in accordance with ENG-QI 5.4.

- ENG-QI 5.6, Revision 4, dated February 24, 2000, "License Renewal Time Limited Aging Analysis," provides guidance for the identification and evaluation of time-limited aging analyses (TLAAs) and associated exemptions as required in 10 CFR Part 54. TLAAs capture certain plant-specific aging analyses that are explicitly based on the current operating term of the plant.

- PTN-ENG-LRSP-99-0063, Rev 2, dated October 30, 2000, "License Renewal System/Structure Scoping Report," identifies the systems and structures at Turkey Point, Units 3 and 4, that are within the scope of license renewal as defined in 10 CFR 54.4. This includes a complete listing of both systems and structures.

- PTN-ENG-LRSC-99-0037, Revision 3, dated November 27, 2000, "License Renewal Screening Results Summary Report — Structures and Structural Components," identifies those structures and structural components outside containment at Turkey Point, Units 3 and 4, that require AMR. The structures and structural components are identified in PTN-ENG-LRSP-99-0063 in accordance with the process of ENG-QI 5.3 as within the scope of license renewal. This document also includes a list of the seismic interaction screening results for the non-nuclear safety-related structural component types that represent a potential seismic interaction.

- PTN-ENG-LRSC-99-0049, Revision 3, dated August 15, 2000, "License Renewal Screening Results Summary Report — Containment Structure and Internal Structural Components," identifies those structural components of the Turkey Point Unit 3 and 4 containment structure that require an AMR. The containment structures are identified in PTN-ENG-LRSP-99-0063 in accordance with the process of ENG-QI 5.3 as being within the scope of license renewal.

The audit team determined that these procedures, in combination with the team's review of a sample of scoping/screening products and team discussions with the applicant personnel who developed these products, provided adequate evidence that the scoping and screening process was conducted in accordance with the requirements of 10 CFR 54.4, "Scope," and 10 CFR 54.21, "Contents of Application — Technical Information."

The audit team compared the Turkey Point Maintenance Rule scoping information to the LRA scoping information because of the overlap in scoping criteria. The team did not find any inconsistencies between the two information sources. All systems that were listed as safety-related for the purposes of the Maintenance Rule were listed as safety-related for the purpose of license renewal. The SSCs related to accidental liquid release and accidental gas release were not included within the scope of license renewal. These SSCs were not included within the scope of license renewal because they were not necessary to prevent or mitigate releases comparable to 10 CFR Part 100 limits and therefore, do not meet any of the safety-related criteria of 10 CFR 54.4(a)(1). These SSCs were also evaluated for inclusion within the scope of license renewal based on 10 CFR 54.4(a)(2) and (a)(3).

The team noted that the applicant needed to make a minor administrative update to these procedures to reflect the current 10 CFR 54.4, language that became effective on January 24, 2000. The current language accounts for licensees that have revised their accident source term. The applicant has not revised its accident source term for Turkey Point; therefore, the

current 10 CFR 54.4 language does not impact the LRA. However, an update will ensure that the applicant is quoting the current and correct 10 CFR 54.4 rule language. This issue was addressed in item 2.1-1 of the staff's request for additional information (RAI) dated February 2, 2001. The applicant's response dated March 22, 2001, resolved this issue by updating the procedure language to reflect the current 10 CFR 54.4, language that became effective on January 24, 2000.

The team also concluded that the applicant did not include within the scope of license renewal all non-safety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified as safety-related. The applicant does not include non-safety-related piping within the scope of license renewal. The team concluded that the applicant should include piping segments for non-safety-related systems with the potential of interaction with safety-related components. This issue was addressed in item 2.1-2 of the staff's RAI dated February 2, 2001. The applicant provided additional information in letters dated March 22, 2001, and May 3, 2001. However, the additional information was insufficient for the staff to determine the acceptability of not including certain non-safety-related piping segments within the scope of license renewal. The issue is also discussed in Section 3.4.16.4 of this SER. This issue is designated open item 2.1.2-1.

2.1.2.2 Review of 10 CFR 50.12 Turkey Point Exemptions and Commission Orders

The audit team reviewed the history of 10 CFR 50.12 Turkey Point exemptions to identify any potential SSCs within the scope of license renewal not identified by the applicant's scoping methodology. The staff reviewed several exemptions and their associated correspondence. Of these, the staff noted that the exemptions that were currently in effect, age-related, and time-limited, had their affected systems included within the scope of license renewal.

The staff reviewed several Commission Orders. All the SSCs referenced in each of the Commission Orders were identified and compared to the list of SSCs included within the scope of license renewal. All SSCs identified in the Commission Orders were included within the scope of license renewal, providing further evidence that the applicant's scoping methodology was effective in identifying the SSCs within the scope of license renewal.

2.1.2.3 Review of Design-Basis Documents

The applicant used several information sources for the scoping and screening process which included the UFSAR, Technical Specifications, licensing correspondence, component database, design drawings, emergency operating procedures, and design-basis documents (DBDs). The applicant developed DBDs that apply to both Turkey Point units and represent the culmination of an extensive design-basis reconstitution effort. After the NRC performed a safety system functional inspection on the applicant's auxiliary feedwater system in 1985, DBDs were prepared for a total of 18 support and accident mitigation systems, as well as selected licensing issues and UFSAR Chapter 14, "Safety Analyses." These DBDs explain the requirements behind the design rather than describing the design itself. These DBDs complement other upper tier documents such as the UFSAR and Technical Specification Bases. Each of the support and accident mitigation system volumes (except the reactor protection system) contains two major documents — a system-level design basis document and a component design requirements document. The applicant uses these DBDs to determine the design-basis in its plant change modification (PCM) process, safety evaluations, operability evaluations, or any

other situation which requires an understanding of fundamental design intent. The audit team reviewed a sample of the DBDs and determined that appropriate SSCs from the DBDs were included within the scope of license renewal.

2.1.3 Conclusion

With the exception of open item 2.1.2-1 relating to scoping and screening for the non-safety-related SSCs that have the potential to interact with safety-related SSCs. The staff finds that there is reasonable assurance that the applicant's methodology for identifying the SSCs within the scope of license renewal is consistent with the requirements of 10 CFR 54.4. Also, with the exception of the open item, the staff finds reasonable assurance that the applicant's scoping and screening process for identifying SCs requiring an AMR is consistent with the requirements of 10 CFR 54.21.

2.2 Plant Level Scoping Results

The supporting statements of consideration (SOCs) for the License Renewal Rule (60 FR 22478) indicate that an applicant has the flexibility to determine the set of SSCs for which an AMR is performed, provided that the set of SSCs encompasses the SSCs for which the Commission has determined that an AMR is required. Accordingly, the staff focused its review on verifying that the implementation of the applicant's methodology, as discussed in Section 2.1 of this SER, did not result in the omission of SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). Therefore, the staff performed the following two-step evaluation:

- The staff determined whether the applicant properly identified the SSCs that are within the scope of license renewal, in accordance with 10 CFR 54.4. As described in more detail below, the staff reviewed selected SSCs that the applicant did not identify as being within the scope of license renewal to verify whether they have any intended functions that are within the scope of license renewal.

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

The staff reviewed the results of the scoping and screening effort to determine if there is reasonable assurance that the applicant identified and listed those SCs that are subject to an AMR in accordance with the requirements stated in 10 CFR 54.21(a)(1).

2.2.1 Summary of Technical Information in the Application

In Sections 2.3 through 2.5 of the LRA, the applicant describes the SSCs that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 54.21(a)(1), respectively. Based on the applicant's license renewal scoping and screening process as described in Section 2.2 of this SER, mechanical systems that are within the scope of license renewal are presented in Section 2.3 of the LRA. Structures that support or provide shelter/protection for the operation of the mechanical systems are presented in section 2.4 of the LRA. Electrical systems and I&C systems that support the operation of both safety- and non-safety-related systems and structures are presented in Section 2.5 of the LRA. Components that are associated with the specific systems and structures, including the bulk commodity items that are common to various systems and structures, are presented in Sections 3.2 through 3.6 of the LRA. In other words, the applicant took a systems/structures approach in identifying (1) all of the SCs and commodities within the mechanical and I&C systems that are subject to AMR, and (2) all of the structural components and commodities that comprise the structures that are subject to an AMR.

The staff evaluated components and commodities associated with all systems and structures in Sections 2.3 through 2.5 and Sections 3.2 through 3.6 in the LRA. The staff used the Turkey Point UFSAR in performing its review. Pursuant to 10 CFR 50.34(b)(2), the UFSAR contains "[a] description and analysis of the SSCs of the facility, with emphasis upon performance requirements, the bases, with technical justification thereof, upon which such requirements have been established, and the evaluations required to show that safety functions will be accomplished." The UFSAR is required to be updated periodically pursuant to 10 CFR 50.71(e). Thus, the UFSAR contains updated plant-specific licensing-basis information regarding the SSCs and their functions.

The staff reviewed Sections 2.3 through 2.5 and Sections 3.2 through 3.6 of the LRA to determine if there is reasonable assurance that the applicant appropriately identified and listed, respectively, those SCs that are subject to an AMR to meet the requirements as stated in 10 CFR 54.21(a)(1).

2.2.2 Staff Evaluation

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

To ensure that the scoping and screening methodology described in Section 2.1 of the LRA was properly implemented and identified the SCs that are subject to an AMR, the staff performed an additional review. To do so, the staff sampled the contents of the UFSAR based on the listing of systems and structures on Tables 2.2-1 and 2.2-2 of the LRA to identify whether there are systems or structures that may have intended functions in accordance with the scoping requirements of 10 CFR 54.4 but were not included by the applicant as being within the scope of license renewal. The staff selected some of the mechanical systems (i.e., the auxiliary steam system, the circulating water cooling system, the new fuel storage area ventilation system, the condensate system, and the radwaste building ventilation system) and structures (i.e., the radwaste building and the new fuel storage and handling vault). The staff agreed with the applicant's omission of these systems and structures from the scope of license renewal on the basis that the systems and structures did not meet one or more of the license renewal scoping criteria in 10 CFR 54.4 and, therefore, are not subject to AMR in accordance with 10 CFR 54.21(a)(1).

2.2.3 Conclusions

The NRC staff reviewed the information submitted by the applicant in the LRA, as well as information in the Turkey Point UFSAR, and did not identify any SSCs that have intended functions and were not already evaluated in the LRA. Therefore, the staff has reasonable assurance that the applicant has appropriately identified the SSCs that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1), respectively. The NRC staff's detailed review of the SCs that are subject to an AMR is provided in Sections 2.3 through 2.5 of this SER.

2.3 System Scoping and Screening Results - Mechanical Systems

2.3.1 Reactor Coolant Systems (RCS)

In Section 2.3.1, "Reactor Coolant Systems," of the LRA, the applicant describes the SSCs of the RCS that are subject to an AMR for license renewal.

As described in the LRA, the RCS consists of the systems and components designed to contain and support the nuclear fuel, contain the reactor coolant, and transfer the heat produced in the reactor to the steam and power conversion systems for the production of electricity.

Unless noted otherwise, the RCSs for Turkey Point, Units 3 and 4, are the same, with no components common to both units. The following components are included in the RCS:

- reactor coolant piping
- regenerative and excess letdown heat exchangers
- pressurizers
- reactor vessels
- reactor vessel internals
- reactor coolant pumps
- steam generators

The license renewal flow diagrams listed in Table 2.3-1 of the LRA show the evaluation boundaries for the portions of RCS that are within the scope of license renewal.

RCS components subject to an AMR include the reactor vessel and control rod drive mechanism pressure boundary, pressurizers, steam generators, reactor vessel internals, reactor coolant pumps (pressure boundary only), reactor coolant piping, valves (pressure boundary only), and fittings. The regenerative and excess letdown heat exchangers that are part of the chemical and volume control system are also addressed in this subsection because they form a part of the RCS pressure boundary.

Class 1 as used in this LRA means the Safety Class 1 definition per American Nuclear Society (ANS) Standard N46.2.

The design code for reactor coolant piping is the 1955 Edition of American National Standards Institute (ANSI) B31.1 with the exception of the pressurizer surge lines that were analyzed to the 1986 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Subsection NB. Class 1 piping starts at, and includes, the circumferential welds joining the piping to the Class 1 components, and typically ends at the second normally closed valve from the RCS or the ⅜-inch flow restrictor in the piping.

The regenerative heat exchangers were designed and fabricated in accordance with the requirements of Tubular Exchanger Manufacturers Association (TEMA) Class R and the ASME Boiler and Pressure Vessel Code, Section III, Class C. The excess letdown heat exchangers were designed and fabricated in accordance with the requirements of TEMA Class R, the ASME Boiler and Pressure Vessel Code, Section III, Class C (tube side), and the ASME Boiler and Pressure Vessel Code, Section VIII (shell side).

The pressurizers were designed and fabricated in accordance with the requirements of the 1965 Edition of the ASME Boiler and Pressure Vessel Code.

The reactor vessels were manufactured by Babcock & Wilcox Co. in accordance with the design and fabrication requirements of the 1965 Edition of the ASME Boiler and Pressure Vessel Code, Section III, through the Summer 1966 Addenda.

The reactor vessel internals were designed prior to the issuance of ASME Boiler and Pressure Vessel Code, Section III, Subsection NG, using internal Westinghouse design criteria that effectively evolved to become the original NG criteria. The reactor vessel internals were designed using the allowable stress levels of the 1965 Edition of the ASME Boiler and Pressure Vessel Code, Section III, Article 4, through the Summer 1966 Addenda.

The reactor coolant pump casings, main flanges, and main flange bolts were analyzed in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Article 4.

The original steam generator components were designed and analyzed to the 1965 Edition of the ASME Boiler and Pressure Vessel Code, through Summer 1965 Addenda. The replacement steam generator components were constructed in accordance with the 1974 Edition of the ASME Boiler and Pressure Vessel Code, through Summer 1976 Addenda.

A component list of the RCS components subject to an AMR and the component intended functions are provided in Table 3.2-1 of the LRA. The AMR for the RCS is discussed in Section 3.2 of the LRA.

2.3.1.1 Westinghouse Owners Group Generic Technical Reports

2.3.1.1.1 Summary of Technical Information in the Application

The applicant actively participated in a WOG effort that developed a series of generic technical reports (WCAPs) intended to demonstrate that the aging effects for RCS components will be adequately managed throughout the period of extended operation. The following WCAPs, which are applicable to Westinghouse RCSs, were submitted to the NRC for approval by Westinghouse:

- WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components"
- WCAP-14574, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers"
- WCAP-14577, "License Renewal Evaluation: Aging Management for Reactor Internals"
- WCAP-14422, "License Renewal Evaluation: Aging Management for Reactor Coolant System Supports" (RCS supports are discussed in Section 2.4.1, "Containments," of the LRA)

NRC-approved generic technical reports may be incorporated by reference in the LRA pursuant to 10 CFR 54.17(e) provided the conditions of approval contained in the safety evaluation of the specific report are met. These reports were not incorporated by reference in the Turkey Point LRA because, as of September 1, 2000 (at the time the LRA was prepared), none had received a final safety evaluation. However, the LRA addresses the applicability of these reports to the associated components at Turkey Point. The staff verified the applicability of the reports to Turkey Point, and requested that the applicant provide additional information and/or clarifications for some of the SCs described in the LRA. It should also be noted that the staff has since issued draft safety evaluations on some of the generic topical reports, and they are discussed in more detail below.

The applicant used the following process to establish the applicability of the WCAPs to the components:

1) <u>Comparison of the component intended functions for the RCS components under review</u>: The Turkey Point-specific component screening review first identifies the component intended functions and then compares these functions to those identified in the generic technical reports. Differences are noted and justification for the variances provided.

2) <u>Identification of the items that are subject to AMR</u>: Turkey Point drawings and pertinent design and field change data are reviewed. The process establishes the full extent to which plant identified scope matches the scope identified in the generic

technical reports. For those components that require an AMR, a comparison of the component material and environment is considered in determining the extent to which the plant scope is bounded by the generic technical report. Areas not bounded are noted and evaluated.

3) Identification of the applicable aging effects: An independent assessment of the applicable aging effects is performed by reviewing plant operating environment, operating stresses, and plant-specific operating experience. This assessment reveals potential aging effects not identified in the generic technical reports. Aging effects for items that are determined to be subject to an AMR but were not identified in the generic technical reports are evaluated.

4) Review of open items and applicant action items: Open items and applicant action items are addressed if available prior to August 1, 2000.

It should be noted that items 1, 2, and 4 are addressed in Section 2.3.1, "Reactor Coolant System," and Section 2.4.1, "Containments," of the LRA. Item 3 is addressed in Section 3.2, "AMR Results — RCS," and Section 3.6, "AMR Results — Structures and Structural Components," of the LRA.

2.3.1.1.2 Staff Evaluation

The staff reviewed this section of the LRA, the relevant sections of the WCAPs on license renewal as discussed earlier, and the staff safety evaluation of these reports to determine whether there is reasonable assurance that the RCS components and supporting structures within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the RCS and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA and the WCAPs to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal and verified that no SCs were inappropriately omitted from consideration as being within the scope of license renewal.

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

2.3.1.1.3 Conclusion

On the basis of the its review of the information presented in Section 2.3.1 of the LRA, related WCAPs, and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance

that the applicant has adequately identified those portions of the RCS and its associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.1.2 Reactor Coolant Piping

2.3.1.2.1 Summary of Technical Information in the Application

Reactor coolant piping consists of piping (including fittings, branch connections, safe ends, thermal sleeves, flow restrictors, and thermowells), pressure retaining parts of valves, and bolted closures and connections. Reactor coolant piping is presented in two parts:

- Class 1 piping
- Non-Class 1 piping

Class 1 Piping: Class 1 piping includes the main coolant piping; pressurizer surge, spray, safety, and relief lines; vents, drains, and instrumentation lines; and Class 1 portions of ancillary systems attached to the RCS. Ancillary systems attached to the RCS include residual heat removal (RHR), safety injection, nuclear steam supply system sampling, and chemical and volume control.

The NRC issued a draft safety evaluation on WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components," on February 10, 2000.

The applicant reviewed the current design and operation of the reactor coolant piping using the process described earlier, and confirmed that the Turkey Point Class 1 piping is bounded by the description of Class 1 piping contained in WCAP-14575 with regard to design criteria and features, materials of construction, fabrication techniques, installed configuration, modes of operation, and environments/exposures. The component intended functions for Class 1 piping include the intended functions identified in WCAP-14575. In addition to the functions identified in WCAP-14575, Turkey Point has identified an additional function for flow-restricting orifices and reducers. These orifices and reducers provide throttling to limit the maximum flow through a postulated break in an attached non-Class I line to a value within the makeup capability of the chemical and volume control system. The applicant has identified this additional function and an aging management program (AMP) for it in response to open item No. 1 from Section 4.2 of WCAP-14575 draft safety evaluation by the staff, as shown in Table 2.3-3 of the LRA.

Non-Class 1 Piping: Non-Class 1 piping is not within the scope of WCAP-14575. However, several non-Class 1 components are within the scope of license renewal. The component intended function of these in-scope non-Class 1 components is maintaining pressure boundary integrity. The following non-Class 1 reactor coolant components require an AMR:

- instrumentation tubing and fittings downstream of flow restrictors

- inner reactor vessel flange O-ring leak detection line tubing, fittings, and valves (pressure boundary only)

- reactor vessel head vent piping, fittings, and valves (pressure boundary only) downstream of the restricting orifices

- instrument air/nitrogen supply piping, tubing, fittings, accumulators, and valves (pressure boundary only) for the power-operated relief valves

- reactor coolant pump motor upper bearing oil heat exchanger and lower bearing oil cooling coil (the heat exchanger and cooling coil form a portion of the component cooling water (CCW) pressure boundary)

2.3.1.2.2 Staff Evaluation

The staff reviewed this section of the LRA, the relevant sections of the WCAP-14575 as discussed earlier in Section 2.3.1.1.1, and the staff safety evaluation of the report to determine whether there is reasonable assurance that the reactor coolant piping components and supporting structures within the scope of license renewal, and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the UFSAR for Turkey Point for the reactor coolant piping and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA and the WCAPs to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal and verified that no SCs were inappropriately omitted from consideration as being within the scope of license renewal.

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

The staff held meetings with the applicant in order to obtain clarification and/or to better understand the applicant's position on some of the issues. A meeting was held on January 4, 2001, in which the staff inquired as to whether Turkey Point had any non-Class 1 flow-restricting orifices, holes, or penetrations which are relied upon to limit reactor coolant leakage or mass flow rate to less than the plant's normal makeup system capacity. Consistent with the LRA supplemental boundary drawings, the applicant affirmed that there are no such non-Class 1 reactor coolant piping components at Turkey Point and therefore they were not listed in the LRA. This was documented in a February 14, 2001, meeting summary.

2.3.1.2.3 Conclusions

On the basis of the staff's review of the information presented in Section 2.3.1 of the LRA, related WCAPs, the supporting information in the Turkey Point UFSAR, and the applicant's responses to the staff's requests for additional information and/or clarifications as discussed in the section above, the staff did not find any omissions by the applicant. Therefore, the staff

concludes that there is reasonable assurance that the applicant has adequately identified those portions of the reactor coolant piping and its associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.1.3 Regenerative and Excess Letdown Heat Exchangers

2.3.1.3.1 Summary of Technical Information in the Application

The regenerative and excess letdown heat exchangers are a part of the chemical and volume control system. They are addressed in this subsection, however, because they are within the RCS pressure boundary.

The regenerative heat exchangers are of a multiple-shell and U-tube design, each consisting of three heat exchangers interconnected in series by piping and mounted on a common support frame. The heat exchangers are designed to recover heat from the letdown stream by heating the charging stream, thus minimizing reactivity effects due to injection of cold water and minimizing thermal stress on the charging line penetrations in the reactor coolant loop piping. The letdown stream flows through the shell of the heat exchangers, and the charging stream flows through the tubes.

The excess letdown heat exchangers are of the U-tube design. Their function is to cool reactor coolant letdown flow equivalent to that portion of the nominal seal injection flow that enters the RCS through the labyrinth of the reactor coolant pump seals. They may be used when the normal letdown path is temporarily out of service or for supplementing the maximum letdown during heatup. The letdown flow passes through the tubes four times, while CCW system flow makes a single pass through the shells.

The component intended functions of the regenerative and excess letdown heat exchangers are to maintain pressure boundary integrity and transfer heat.

2.3.1.3.2 Staff Evaluation

The staff reviewed this section of the LRA, the relevant sections of the WCAPs on license renewal as discussed earlier in Section 2.3.1.1.1, and the staff safety evaluations of these reports to determine whether there is reasonable assurance that the regenerative and excess letdown heat exchangers components and supporting structures within the scope of license renewal, and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the regenerative and excess letdown heat exchangers and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA and the WCAPs to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal and verified that no SCs were inappropriately omitted from consideration as being within the scope of license renewal.

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

2.3.1.3.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1 of the LRA, related WCAPs, and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the regenerative and excess letdown heat exchangers and their associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.1.4 Pressurizers

2.3.1.4.1 Summary of Technical Information in the Application

The pressurizers are vertical cylindrical vessels containing electric heaters in the lower heads and water spray nozzles in the upper heads. Since sources of heat in the RCS are interconnected by piping with no intervening isolation valves, relief protection for the RCS is provided on the pressurizers. Overpressure protection consists of three code safety valves and two power-operated relief valves on each pressurizer. Piping attached to the pressurizer is Class 1 up to and including the second isolation valve (with the exception of the pressurizer code safety valves).

A draft safety evaluation for WCAP-14574, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers," was issued on August 7, 2000. The applicant reviewed the current design and operation of the pressurizers using the process described earlier, and has confirmed that the Turkey Point pressurizers are bounded by the description contained in WCAP-14574. The component intended functions for the pressurizers are consistent with the intended functions identified in WCAP-14574.

2.3.1.4.2 Staff Evaluation

The staff reviewed this section of the LRA, the relevant sections of WCAP-14574 as discussed earlier in Section 2.3.1.1.1, and the staff safety evaluation of this report to determine whether there is reasonable assurance that the pressurizer components and supporting structures within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the LRA for the pressurizer and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA and the WCAPs to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal.

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

After completing the initial review, by letter dated February 2, 2001, the staff issued an RAI regarding the pressurizers, and the applicant submitted responses to those RAIs, as discussed below.

The LRA stated that the Turkey Point pressurizers are bounded by the description contained in generic report WCAP-14574, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers." WCAP-14574 determined that the pressurizer manway pad gasket seating surface requires aging management. However, the staff noted that the subject component was not identified in the LRA (Table 3.2-1) as requiring aging management. In RAI 2.3.1-1, the staff, therefore, requested the applicant to include the subject component at Turkey Point as within scope and to submit an AMP for it. In addition, the staff requested the applicant to verify whether the component is covered under the Boric Acid Wastage Surveillance Program to ensure that these pressure boundary components do not fail prematurely due to accelerated corrosion. In a response dated March 22, 2001, the applicant explained that at Turkey Point the pressurizer manway pad gasket seating surfaces are considered part of the pressurizer vessel upper heads, and therefore were not addressed as separate components, as it was done in the generic report. The applicant clarified that the subject components are included within scope in LRA Table 3.2-1 (pages 3.2-63 and 3.2-65) in the component/commodity group identified as "upper heads, lower heads." The applicant further confirmed that loss of material from the pressurizer upper heads, lower heads, and upper head manway covers is managed by the Boric Acid Wastage Surveillance Program as listed in the LRA, Table 3.2-1 (pages 3.2-65 and 3.2-66).

In addition to issuing the RAIs discussed above, the staff held meetings with the applicant in order to obtain clarification and/or to better understand the applicant's position on some of the issues. A meeting was held on January 4, 2001, in which the staff pointed out that Table 3.2-1 on page 3.2-64 of the LRA indicates that pressurizer instrument nozzle thermowells are within the scope of license renewal. However, it was not clear whether this includes the instrument nozzle itself, and particularly, its welded portion. Both intergranular and transgranular type stress corrosion cracking has been detected in the instrument nozzles of other Westinghouse PWRs. The applicant verified that the instrument nozzles including the welded material are included within the scope of license renewal. The item in question, "instrument nozzle thermowells" was two separate items, the nozzle and theromwells. This was documented in the February 14, 2001, meeting summary.

2.3.1.4.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1 of the LRA, related WCAPs, the supporting information in the Turkey Point UFSAR, and the applicant's responses to the staff's requests for additional information and/or clarifications as discussed in the section above, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the pressurizer and its associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.1.5 Reactor Vessels

2.3.1.5.1 Summary of Technical Information in the Application

The reactor vessels consist of cylindrical vessel shells, lower vessel heads, closure heads, nozzles, interior attachments, and associated pressure-retaining bolting. The vessels are fabricated of low alloy steel with austenitic stainless steel cladding on internal surfaces exposed to the reactor coolant fluid. Coolant flow for each reactor vessel enters through three inlet nozzles in a plane just below the vessel flange and above the core. The coolant flows downward through the annular space between the vessel wall and the core barrel into a plenum at the bottom of the vessel, where it reverses direction, passes up through the core into the upper plenum, and then flows out of the vessel through three exit nozzles located on the same plane as the inlet nozzles. The component intended functions of the reactor vessels include maintaining pressure boundary integrity and providing structural support.

Control rod drive mechanism housings are attached to flanged nozzles, which penetrate the closure heads. The active portions of the control rod drive mechanisms do not require an AMR per 10 CFR 54.21(a)(1)(i). The part-length control rod drive mechanisms, although they remain installed, are not being used at Turkey Point. Note that two of the part-length control rod drive mechanism housings on each reactor vessel have been modified for the installation of the reactor vessel level indication system. The control rod drive mechanism housings are threaded and seal-welded to the reactor vessel head penetrations. The component intended function of the control rod drive mechanism housings is to maintain pressure boundary integrity.

Bottom-mounted instrumentation penetrates the reactor vessel lower head domes. The 50 bottom head instrumentation tubes and attached bottom-mounted guide tubes, flux thimble tubes, and seal table for each reactor vessel provide the capability of monitoring core flux distribution. The component intended function of the bottom-mounted instrumentation is to maintain pressure boundary integrity.

2.3.1.5.2 Staff Evaluation

The staff reviewed Section 2.3.1.5 of the LRA to determine whether there is reasonable assurance that the reactor vessel components and supporting structures within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of
10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the reactor vessel and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal and verified that no SCs were inappropriately omitted from consideration as being within the scope of license renewal.

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

2.3.1.5.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1 of the LRA and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the reactor vessels and their associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.1.6 Reactor Vessel Internals

2.3.1.6.1 Summary of Technical Information in the Application

The reactor vessel internals are designed to support, align, and guide the core components and to support and guide incore instrumentation. The reactor vessel internals consist of two basic assemblies for each reactor vessel. Specifically, these include an upper internals assembly that is removed during each refueling operation to obtain access to the reactor core, and a lower internals assembly that can be removed, if desired, following a complete core unload.

Each lower internals assembly is supported in the vessel by resting on a ledge below the vessel-head mating surface and is closely guided at the bottom by radial support/clevis assemblies. Each upper internals assembly is clamped at this same ledge by the reactor vessel head. The bottom of the upper internals assembly is closely guided by the core barrel alignment pins of the lower internals assembly.

The lower internals comprise the core barrel, thermal shield, core baffle assembly, lower core plate, intermediate diffuser plate, bottom support casting, and supporting structures. The upper internals assembly (upper core support structure) is a rigid member composed of the top support plate and deep beam section, support columns, control rod guide tube assemblies, and the upper core plate. Upon installation of the upper internals assembly installation, the last three parts are physically located inside the core barrel. The component intended functions of the reactor vessel internals are core support, coolant distribution, guidance and support of instrumentation and control rods, and vessel shielding.

At the time the LRA was prepared, a draft safety evaluation for WCAP-14577, "License Renewal Evaluation: Aging Management for Reactor Internals," had not yet been issued. The applicant reviewed the current design and operation of the reactor vessel internals using the process described earlier, and has confirmed that the Turkey Point reactor vessel internals are bounded by the description contained in WCAP-14577. The component intended functions for the reactor vessel internals are consistent with the intended functions identified in WCAP-14577.

2.3.1.6.2 Staff Evaluation

The staff reviewed Section 2.3.1.6 of the LRA, the relevant sections of the WCAP-14577 as discussed earlier in Section 2.3.1.1.1, and the staff safety evaluations of these reports to determine whether there is reasonable assurance that the reactor vessel internals components and supporting structures within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the reactor vessel internals and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA and the WCAPs to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal and verified that no SCs were inappropriately omitted from consideration as being within the scope of license renewal.

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

2.3.1.6.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1 of the LRA, related WCAPs, and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the reactor vessel internals and their associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and
10 CFR 54.21(a)(1).

2.3.1.7 Reactor Coolant Pumps

2.3.1.7.1 Summary of Technical Information in the Application

Each of the three reactor coolant loops for Turkey Point, Units 3 and 4, contains a vertically mounted, single-stage centrifugal reactor coolant pump that employs a controlled leakage seal assembly. The reactor coolant pumps provide the motive force for circulating the reactor

coolant through the reactor core, piping, and steam generators. The reactor coolant pumps used at Turkey Point are Westinghouse Model 93. The component intended function of the reactor coolant pumps is to maintain pressure boundary integrity. The components that support this function include the casing, cover, pressure-retaining bolting, and integral thermal barrier heat exchanger. The reactor coolant pump seals are not subject to an AMR for the following reasons:

- Seal leakoff is closely monitored in the control room, and a high leakoff flow is alarmed as an abnormal condition requiring corrective action.
- The reactor coolant pump seal package and its constituent parts are routinely inspected and parts are replaced, as required based on condition, for each reactor coolant pump.
- Plant operating experience has demonstrated the effectiveness of these activities.

The above clarification for excluding reactor coolant pump seals from an AMR was provided in the LRA in response to the open item No. 1 from Section 4.2 of the WCAP-14575 draft safety evaluation by the staff, as shown in Table 2.3-3 of the LRA.

The portions of the reactor coolant pump rotating elements that are located above the pump coupling, including the electric motor and the flywheel, are not subject to an AMR in accordance with 10 CFR 54.21(a)(1)(i). (Note that the applicant performed a time-limited aging analysis (TLAA) for the extended period of operation for the flywheel, as required by 10 CFR 54.21(c), and the results are discussed in Section 4.3.3 of the LRA.)

The reactor coolant pumps are within the scope of WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components." The applicant reviewed the current design and operation of the reactor coolant pumps using the process described earlier, and confirmed that the reactor coolant pumps are bounded by the description contained in WCAP-14575 with regard to design criteria and features, materials of construction, fabrication techniques, installed configuration, modes of operation, and environments/exposures. The component intended function for the reactor coolant pumps is also consistent with the intended function identified in WCAP-14575.

2.3.1.7.2 Staff Evaluation

The staff reviewed Section 2.3.1.7 of the LRA, the relevant sections of WCAP-14575 as discussed earlier, and the staff safety evaluations of these reports to determine whether there is reasonable assurance that the reactor coolant pumps components and supporting structures within the scope of license renewal, and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the reactor coolant pumps and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA and the WCAPs to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The

staff then reviewed SCs that were identified as not being within the scope of license renewal and verified that no SCs were inappropriately omitted from consideration as being within the scope of license renewal.

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

2.3.1.7.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1 of the LRA, related WCAP, and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the reactor coolant pumps and their associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.1.8 Steam Generators (SGs)

2.3.1.8.1 Summary of Technical Information in the Application

There are three steam generators installed in each unit. One steam generator is installed in each reactor coolant loop. Each steam generator is a vertical shell and tube heat exchanger, which transfers heat from a single-phase fluid at high temperature and pressure (the reactor coolant) in the tube side to a two-phase (steam-water) mixture at lower temperature and pressure in the shell side.

The reactor coolant enters and exits the tube side of each steam generator through nozzles located in the lower hemispherical head. The RCS fluid flows through inverted U-tubes connected to the tube sheet. The lower head is divided into inlet and outlet chambers by a vertical partition plate extending from the lower head to the tube sheet. The steam-water mixture is generated on the secondary, or shell, side, and flows upward through moisture separators and dryers to the outlet nozzle at the top of the vessel, providing essentially dry, saturated steam. Manways are provided to permit access to both sides of the lower head and to the U-tubes and moisture-separating equipment on the shell side of the steam generators.

The component intended functions of the steam generators include pressure boundary integrity, heat transfer, flow distribution, structural support, and throttling.

2.3.1.8.2 Staff Evaluation

The staff reviewed Section 2.3.1.8 of the LRA to determine whether there is reasonable assurance that the steam generator components and supporting structures that are within the scope of license renewal and subject to AMR have been identified in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). This was accomplished as described below.

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the steam generators and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal.

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

After completing the initial review, by letter dated February 2, 2001, the staff issued an RAI regarding the steam generators, and the applicant submitted responses dated March 22, 2001, to those RAIs, as discussed below.

The staff noted that the LRA (Table 3.2-1) did not identify the SG primary and secondary side manway gasket seating surfaces as within the scope of license renewal. The staff requested the applicant in RAI 2.3.1-2 to justify exclusion of these components or to submit an AMP for these components. The staff also requested that the applicant verify whether the primary side manway gasket seating surface is covered under the Boric Acid Wastage Surveillance Program to ensure that these pressure boundary components do not fail prematurely due to an accelerated rate of corrosion. The applicant responded by explaining that the SG primary side manway gasket seating surfaces are considered part of the steam generator channel heads, and are therefore included in LRA Table 3.2-1 (page 3.2-88), as the component/commodity group identified "channel heads, primary manways, primary inlet and outlet nozzles." The applicant also verified that loss of material from the channel heads and primary manways is managed by the Boric Acid Wastage Surveillance Program as listed in Table 3.2-1 (page 3.2-88). The applicant further stated that the SG secondary side manway gasket seating surfaces are considered part of the steam generator shells, and are therefore included within the scope of license renewal in LRA Table 3.2-1 (page 3.2-88) in the component/commodity group identified as, "upper and lower shells, elliptical heads, transition cones, feedwater nozzles, steam outlet nozzles." The applicant also clarified that loss of mechanical closure integrity of secondary mechanical closures is managed by the ASME Section XI, Subsection IWB, IWC, and IWD Inservice Inspection Program, as listed in Table 3.2-1 (page 3.2-89).

In addition to the RAIs discussed above, the staff held meetings with the applicant in order to obtain clarification and/or to better understand the applicant's position on some of the issues. A meeting was held on January 4, 2001, in which the staff noted that the LRA (Table 3.2-1) identified SG primary manways and their bolting to be within the scope of license renewal; however, only the boltings for mechanical closures in the secondary side of the SG were included within the scope of license renewal. The staff requested the applicant to justify why the secondary side manways were not identified when these are also part of the pressure boundary. The applicant clarified that Table 3.2-1 includes a line item for secondary closures, and those secondary closures include all of the secondary manways, as well as other smaller closures. This was documented in a February 14, 2001, meeting summary.

2.3.1.8.3 Conclusions

On the basis of its review of the information presented in Section 2.3.1 of the LRA, the supporting information in the Turkey Point UFSAR, and the applicant's responses to the staff's request for additional information and/or clarifications as discussed in the section above, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the steam generators and their associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.2 Engineered Safety Features (ESF) Systems

In Section 2.3.2, "Engineered Safety Features systems," of the LRA, the applicant described the SSCs of the ESF systems that are subject to an AMR for license renewal.

As described in the LRA, ESF systems consist of systems and components designed to function under accident conditions to minimize the severity of an accident or to mitigate the consequences of an accident. In the event of a loss-of-coolant accident, the ESF systems provide emergency coolant to ensure structural integrity of the core, to maintain the integrity of the containment, and to reduce the concentration of fission products expelled to the containment building atmosphere. Unless noted otherwise, the ESF systems for Turkey Point, Units 3 and 4, are the same.

The following systems are included in this subsection of the LRA:

- emergency containment cooling system
- containment spray
- containment isolation
- safety injection
- RHR
- emergency containment filtration
- containment post-accident monitoring and control

2.3.2.1 Emergency Containment Cooling

In Section 2.3.2.1, "Emergency Containment Cooling," of the LRA, the applicant described the emergency containment cooling and the components therein that are within the scope of license renewal. The applicant also identified which of the in-scope components are subject to an AMR. The design of the emergency containment cooling is further described in Section 6.3 of the Turkey Point UFSAR.

2.3.2.1.1 Technical Information in the Application

The safety function of the emergency containment cooling is to remove sufficient heat to maintain the containment below its structural design pressure and temperature during a loss-of-coolant accident or main steam line break. The emergency containment fan cooling units continue to remove heat after the design-basis accident and reduce containment pressure to atmospheric. Heat removed from the containment is transferred to the CCW system. The

components of the emergency containment cooling within the scope of license renewal and subject to AMR consist of three fan cooling units (pressure boundary only) and associated heat exchanger coils.

The intended function of these components within the scope of license renewal is to maintain the pressure boundary integrity and heat transfer.

2.3.2.1.2 Staff Evaluation

The staff reviewed Section 2.3.2.1 of the LRA, Section 6.3 of the UFSAR, and the associated P&IDs to determine whether there is reasonable assurance that the applicant has identified the emergency containment cooling and its components within the scope of license renewal in accordance with 10 CFR 54.4(a) and properly identified the components subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The applicant highlighted the portions of the emergency containment cooling on the P&IDs (as listed in Table 2.3-4 of the LRA) that are within the scope of license renewal and identified the components with their intended functions in Table 3.3-1 of the LRA. The staff reviewed the components in the table and verified them with the P&IDs. Four component commodity groups were identified in the table that require an AMR. They are the emergency containment cooler headers, emergency containment cooler tubes, emergency containment housings, and bolting.

In its submittal, the applicant also identified the license renewal interface boundaries of the emergency containment cooling. The staff reviewed the interface boundaries within the emergency containment cooling for the license renewal in addition to all the interface boundaries with other SSCs. The staff verified them with the P&IDs to ensure that there are no other interface boundaries that were not identified by the applicant. The staff also reviewed the Turkey Point UFSAR to determine if there were any safety-related system functions that were not identified in the LRA or if there were any SCs that might have been omitted from consideration as being within the scope of license renewal. Based on this review, the staff found that the applicant has properly defined the interface boundaries within the scope of license renewal.

On the basis of the above review, the staff did not find any omissions in the applicant's scoping of the components and their interface boundaries that require an AMR. The applicant has properly highlighted all portions of the emergency containment cooling in the P&IDs and identified the component commodity groups in Table 3.3-1 of the LRA. Therefore, the staff has reasonable assurance that the applicant has identified the components of the emergency containment cooling that fall within the scope of license renewal and subject to an AMR.

2.3.2.1.3 Conclusion

On the basis of its review of the information provided in Section 2.3.2.1 of the LRA, and Section 6.3 of the UFSAR, the staff found no omissions by the applicant. Therefore, the staff concludes that there should be reasonable assurance that the applicant has adequately identified those portions of the emergency containment cooling that fall within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.3.2.2 Containment Spray System

In Section 2.3.2.2, "Containment Spray," of the LRA, the applicant described the containment spray system and the component therein that are within the scope of license renewal. The applicant also identified which of those in-scope components are subject to an AMR. The design of the containment spray system is described in Section 6.4 of the Turkey Point UFSAR.

2.3.2.2.1 Technical Information in the Application

The safety function of the containment spray system is to remove sufficient heat to maintain the containment below its design pressure and temperature during a loss-of-coolant accident or main steam line break. The containment spray system is composed of two motor-driven pumps, each discharging to two spray lateral headers located near the top of the containment structure. The system also utilizes the RHR pumps and heat exchangers for the long-term recirculation phase of containment spray (Section 2.3.2.5). Additionally, the containment spray system provides a source of water for emergency containment filtration spray (Section 2.3.2.6). The components of the containment spray system within the scope of license renewal and subject to AMR consist of two redundant trains of two pumps, two containment spray headers, and the supporting equipment (lube oil coolers and seal water cyclone separators), piping and valves.

The intended functions of these components within the scope of license renewal are to maintain the containment spray system pressure boundary integrity, spray, throttling, filtration, and heat transfer.

2.3.2.2.2 Staff Evaluation

The staff reviewed Section 2.3.2.2 of the LRA, Section 6.4 of the UFSAR, and the associated P&IDs to determine whether there is reasonable assurance that the applicant has identified the containment spray and its components within the scope of license renewal in accordance with 10 CFR 54.4(a) and properly identified the components subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The applicant highlighted the portions of the containment spray on the P&IDs (as listed in Table 2.3-4 of the LRA) that are within the scope of license renewal and identified the components with their intended functions in Table 3.3-2 of the LRA. The staff reviewed the components in the table and verified them with the P&IDs. They are the pumps and valves (pressure boundary only), heat exchangers, cyclone separators, piping, tubing, fittings, orifices, and spray nozzles. In Table 3.3-2, cyclone separators were included for internal environmental aging effects and were omitted from the list for external environmental aging effects. The staff's request for additional information dated February 22, 2001, raised a concern regarding why the cyclone separators were not listed for external aging effects in Table 3.3-2 as part of safety-related components that are subject to an AMR. The applicant responded by a letter dated March 22, 2001, that these were categorized as a component type "filter" for the purpose of conducting an aging management review. Table 3.3-2 of the LRA has been supplemental by the RAI response to list cyclone separators as separate item for managing external aging effects. The staff finds this acceptable.

In its submittal, the applicant also identified a number of license renewal interface boundaries within the containment spray. The staff verified these boundaries with the P&IDs to ensure that there are no other interface boundaries that were not identified by the applicant. The staff also reviewed the Turkey Point UFSAR to determine if there were any safety-related system functions that were not identified in the LRA or if there were any SCs that might have been omitted from consideration as being within the scope of license renewal. Based on this review, the staff found that the applicant has properly defined the interface boundaries within the scope of license renewal.

On the basis of the above review, the staff did not find any other omissions in the applicant's scoping of the components and their interface boundaries that require an AMR. The applicant has properly highlighted all portions of the containment spray in the P&IDs and identified the component commodity groups in Table 3.3-2 of the LRA. Therefore, the staff has reasonable assurance that the applicant has identified the components of the containment spray system that fall within the scope of license renewal and subject to an AMR.

2.3.2.2.3 Conclusion

On the basis of its review of Section 2.3.2.1 of the LRA, and 6.3 of the UFSAR, the staff found no omissions by the applicant. Therefore, the staff concludes that there should be reasonable assurance that the applicant has adequately identified those portions of the containment spray that fall within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1) respectively.

2.3.2.3 Containment Isolation

In Section 2.3.2.3, "Containment Isolation," of the LRA, the applicant described the containment isolation and the components therein that are within the scope of license renewal. The applicant also identified which of those in-scope components are subject to an AMR. The design of the containment isolation system is described in Section 6.6 of the Turkey Point UFSAR.

2.3.2.3.1 Technical Information in the Application

The safety function of the containment isolation is to provide closure to or integrity of containment penetrations to prevent leakage of uncontrolled or unmonitored radioactive materials to the environment. The applicant stated in Section 2.3.2.3 of the LRA that the portions of the containment isolation system within the scope of license renewal are the penetration mechanical components that are not covered by other sections of the LRA. These include the penetrations for the breathing air system, nitrogen and hydrogen system, and containment purge system. The components of the containment isolation (breathing air, nitrogen and hydrogen, and containment purge) that are within the scope of license renewal and subject to an AMR include valves (pressure boundary only), piping, tubing, fittings, and debris screens (containment purge).

The intended function of these components within the scope of license renewal is to maintain the system pressure boundary integrity.

2.3.2.3.2 Staff Evaluation

The staff reviewed Section 2.3.2.3 of the LRA, Section 6.6 of the UFSAR to determine whether there is reasonable assurance that the applicant has identified the containment isolation system (breathing air, nitrogen and hydrogen, and containment purge) and its components that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The applicant highlighted the portions of the containment isolation on the P&IDs (as listed in Table 2.3-4 of the LRA) that are within the scope of license renewal and identified the components with their intended functions in Table 3.3-3 of the LRA. The staff reviewed the components in the table and verified them with the P&IDs. The four component commodity groups were identified in the table that require an AMR. They are the valves piping/fittings, tubing/fittings, debris screen, and bolting.

In its submittal, the applicant also identified the license renewal interface boundaries of the containment isolation system. The staff verified them with the P&IDs to ensure that there are no other interface boundaries that were not identified by the applicant. The staff also reviewed the Turkey Point UFSAR to determine if there were any safety-related system functions that were not identified in the LRA or if there were any SCs that might have been omitted from consideration as being within the scope of license renewal. Based on this review, the staff found that the applicant has properly defined the interface boundaries within the scope of license renewal.

On the basis of the above review, the staff did not find any omissions in the applicant's scoping of the components and their interface boundaries by the applicant that require an AMR. The applicant has properly highlighted all portions of the containment isolation in the P&IDs and identified the component commodity groups in Table 3.3-3 of the LRA. Therefore, the staff has reasonable assurance that the applicant has identified the components of the containment isolation system that fall within the scope of license renewal and are subject to an AMR.

2.3.2.3.3 Conclusion

On the basis of its review of Section 2.3.2.3 of the LRA, and Section 6.6 of the UFSAR, the staff found no omissions by the applicant. Therefore, the staff concludes that there should be reasonable assurance that the applicant has adequately identified those portions of the containment isolation that fall within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1) respectively.

2.3.2.4 Safety Injection

2.3.2.4.1 Summary of Technical Information in the Application

The safety injection system, which includes the safety injection accumulators, provides emergency core cooling and reactivity control during and following design-basis accidents.

The flow diagrams listed in Table 2.3-4 of the LRA show the evaluation boundaries for the portions of the safety injection system that are within the scope of license renewal. Insulation is not within the scope of license renewal for the safety injection system because the system does

not contain boric acid solutions at concentrations that require heat tracing, tank heaters, and/or insulation to prevent precipitation.

The safety injection system is within the scope of license renewal because it contains the following types of SSCs:

- SSCs that are safety-related and are relied upon to remain functional during and following design-basis events
- non-safety-related SSCs whose failure could prevent satisfactory accomplishment of the safety-related functions
- SSCs that are a part of the Environmental Qualification Program
- SSCs that are relied on during certain postulated fire and station blackout events

The intended functions for safety injection components subject to an AMR include pressure boundary integrity, heat transfer, and throttling. A complete list of safety injection components requiring an AMR and the component intended functions is provided in Table 3.3-4 of the LRA. These include refueling water storage tanks, accumulators, safety injection pumps and valves (pressure boundary only), pump thrust bearing coolers, pump shaft seal heat exchanger tubes, pump shaft seal heat exchanger tube shields, pump shaft seal heat exchanger shells and covers, piping/fittings, tubing/fittings, flow elements, orifices, and bolting. The AMR for the safety injection system is discussed in Section 3.3 of the LRA.

2.3.2.4.2 Staff Evaluation

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

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the updated final safety analysis report (the UFSAR for Turkey Point) for the ESF and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal.

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

The staff held meetings with the applicant in order to obtain clarification and/or to better understand the applicant's position regarding some of the SSCs within the ESF systems. Such a meeting was held on January 4, 2001, in which some of the items that were discussed are presented below and documented in a February 14, 2001, meeting summary.

Tables 3.3-4 and 3.3-5 of the LRA did not identify sump screens and/or vortex breakers that may be used in pump suction lines to protect the pumps from debris and/or cavitation following a loss-of-coolant accident as being within the scope of license renewal and requiring aging management. At the meeting the staff requested that the applicant verify that if the plant is equipped with such passive components, they are within scope. The applicant stated that the sump screens at Turkey Point, as shown in drawings 3-RHR-01 and 4-RHR-01, have been included within the scope of license renewal. Furthermore, consistent with the boundary drawings, as confirmed by the applicant during the meeting, the facility does not have any vortex breakers.

In addition, Tables 3.3-4 and 3.3-5 of the LRA did not identify screens and/or vortex breakers that may be used in pump suction lines inside the tanks from which emergency core cooling system (ECCS) water is drawn in order to protect the pumps from debris and/or cavitation as within the scope of license renewal and requiring aging management. The staff requested the applicant to identify those tanks and to submit an AMR for the screens and/or vortex breakers. Furthermore, consistent with the boundary drawings, as confirmed by the applicant during the meeting, the facility does not have any vortex breakers or screens in pump suction lines inside tanks.

2.3.2.4.3 Conclusions

On the basis of its review of the information presented in Section 2.3.2 of the LRA, the supporting information in the Turkey Point UFSAR, and the applicant's responses to the staff's requests for additional information and/or clarifications as discussed in the section above, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the safety injection system and its associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.2.5 Residual Heat Removal

2.3.2.5.1 Summary of Technical Information in the Application

The RHR system delivers borated water to the reactor coolant systems during the injection phase of a design-basis accident. Following a loss-of-coolant accident, the RHR system cools and recirculates water that is collected in the containment recirculation sumps, and returns it to the reactor coolant, containment spray, and safety injection systems to maintain reactor core and containment cooling. In addition, during normal plant operations, the RHR system removes residual and sensible heat from the core during plant shutdown, cooldown, and refueling operations.

The flow diagrams listed in Table 2.3-4 of the LRA show the evaluation boundaries for the portions of the RHR system that are within the scope of license renewal.

The RHR system is within the scope of license renewal because it contains the following types of SSCs:

- SSCs that are safety-related and are relied upon to remain functional during and following design-basis events
- non-safety-related SSCs whose failure could prevent satisfactory accomplishment of the safety-related functions
- SSCs that are a part of the Environmental Qualification Program
- SSCs that are relied on during certain postulated fire events

The intended functions for RHR components subject to an AMR include pressure boundary integrity, heat transfer, and throttling. A complete list of RHR components requiring an AMR and the component intended functions is provided in Table 3.3-5 of the LRA. These include RHR pumps and valves (pressure boundary only), heat exchanger shells and baffles, heat exchanger tubes, heat exchanger tube sheets, pump seal water heat exchanger shells, covers and baffles, pump seal water heat exchanger tubes, piping/fittings, tubing/fittings, thermowells, flow-elements, orifices, check valve 3-753A, and bolting. The AMR for the RHR system is discussed in Section 3.3 of the LRA.

2.3.2.5.2 Staff Evaluation

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

As part of the evaluation, the staff determined whether the applicant had properly identified the SSCs within the scope of license renewal and subject to an AMR, pursuant to 10 CFR 54.4(a) and 10 CFR 54.21(a)(1). The staff reviewed portions of the Turkey Point UFSAR for the RHR system and associated pressure boundary components and compared the information in the UFSAR with the information in the LRA to identify those portions that the LRA did not identify as being within the scope of license renewal and subject to an AMR. The staff then reviewed SCs that were identified as not being within the scope of license renewal.

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

In a meeting held on January 4, 2001, the staff pointed out that the LRA stated that there are two lateral spray headers located near the top of the containment structure spray water (supplied by the RHR system) to limit containment pressure following a loss-of-coolant accident. These components, however, were not listed in Table 3.3-2 of the LRA. The staff,

therefore, requested the applicant to verify whether these headers are within the scope of license renewal and are subject to aging management requirements. The applicant clarified that the line item in Table 3.3-2 of the LRA, piping/fittings downstream of motor-operated valves, 3/4-880A and -880B as confirmed by drawings 3-CS-01 and 4-CS-01, includes the subject components, which are therefore within scope.

2.3.2.5.3 Conclusions

On the basis its review of the information presented in Section 2.3.2 of the LRA, the supporting information in the Turkey Point UFSAR, and the applicant's responses to the staff's requests for additional information and/or clarifications as discussed in the section above, the staff did not find any omissions by the applicant. Therefore, the staff concludes that there is reasonable assurance that the applicant has adequately identified those portions of the RHR system and its associated (supporting) SCs that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.2.6 Emergency Containment Filtration

In Section 2.3.2.6, "Emergency Containment Filtration," of the LRA, the applicant described the emergency containment filtration and the component therein that are within the scope of license renewal. The applicant also identified which of those in-scope components are subject to an AMR. The design of the emergency containment filtration is described in Section 6.3 of the Turkey Point UFSAR.

2.3.2.6.1 Technical Information in the Application

The safety function of the emergency containment filtration is to reduce iodine concentration in the containment atmosphere, following a loss-of-coolant accident with failed fuel, to levels ensuring that the offsite dose will not exceed the guidelines of 10 CFR Part 100 at the site boundary and to assist in limiting the dose to the control room operators to less than the limits prescribed by 10 CFR Part 50, Appendix A, General Design Criterion 19. Emergency containment filtration consists of three filter units, each containing a moisture separator, a high-efficiency particulate filter bank, an impregnated charcoal filter bank, and a fan. The components of the emergency containment filtration within the scope of license renewal and subject to AMR consist of three filter units and valves (pressure boundary only), piping, tubing, fittings, and spray nozzles. Also, included within the scope are of license renewal components that carry water from the containment spray to the emergency containment filtration for filter spray. The intended function of these components within the scope of license renewal is to maintain the pressure boundary integrity and spray.

2.3.2.6.2 Staff Evaluation

The staff reviewed Section 2.3.2.6 of the LRA, Section 6.3 of the UFSAR, and the associated P&IDs to determine whether there is reasonable assurance that the applicant has identified the emergency containment filtration and its components within the scope of license renewal in accordance with 10 CFR 54.4(a) and properly identified the components subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The applicant highlighted the portions of the emergency containment filtration on the P&IDs (as listed in Table 2.3-4 of the LRA) that are within the scope of license renewal and identified the components with their intended functions in Table 3.3-6 of the LRA. The staff reviewed the components in the table and verified them with the P&IDs. The four component commodity groups were identified in the table that require an AMR. They are the emergency containment filter housings, emergency containment filter floodjet spray nozzles, piping/fittings copper, valves piping/fittings and tubing/fittings stainless steel and bolting.

In its submittal, the applicant also identified the license renewal interface boundaries of the emergency containment filtration. The staff reviewed the interface boundaries within the emergency containment filtration for the license renewal in addition to all the interface boundaries with other SSCs. The staff verified them with the P&IDs to ensure that there are no other interface boundaries that were not identified by the applicant. The staff also reviewed the Turkey Point UFSAR to determine if there were any safety-related system functions that were not identified in the LRA or if there were any SCs that might have been omitted from consideration as being within the scope of license renewal. Based on this review, the staff found that the applicant has properly defined the interface boundaries within the scope of license renewal.

On the basis of the above review, the staff did not find any omissions in the applicant's scoping of the components and their interface boundaries that require an AMR. The applicant has properly highlighted all portions of the emergency containment filtration in the P&IDs and identified the component commodity groups in Table 3.3-6 of the LRA. Therefore, the staff has reasonable assurance that the applicant has identified the components of the emergency containment filtration that fall within the scope of license renewal and subject to an AMR.

2.3.2.6.3 Conclusion

On the basis of its review, the staff found no omissions by the applicant. Therefore, the staff concludes that, there should be reasonable assurance that the applicant has adequately identified those portions of the emergency containment filtration that fall within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.3.2.7 Containment Post-Accident Monitoring and Control

In LRA Section 2.3.2.7, "Containment Post-Accident Monitoring and Control," the applicant describes the components of the containment post-accident monitoring and control system that are within the scope of license renewal and subject to an AMR. This system is further described in various sections of the Turkey Point UFSAR, as noted below.

2.3.2.7.1 Summary of Technical Information in the Application

Containment post-accident monitoring and control includes the following subsystems:

- post-accident hydrogen monitoring
- containment pressure monitoring
- post-accident sampling
- post-accident hydrogen control

- containment air particulate and gas monitoring

The LRA addresses the mechanical SCs that are required to support the system intended functions of these subsystems. The screening results for electrical/I&C SCs are provided in Section 2.5 of the LRA. The applicant states that two subsystems of the containment post-accident monitoring and control system, namely the containment water level monitoring and containment high range radiation monitoring subsystems, do not contain mechanical SCs that are required to support the intended functions of these subsystems. Therefore, SCs associated with the containment water level monitoring and containment high range radiation monitoring subsystems are addressed in Section 2.5.

Post-accident hydrogen monitoring provides indication of the hydrogen gas concentration in the containment atmosphere following a loss-of-coolant accident. The mechanical portions of post-accident hydrogen monitoring provide a flow path from the containment to the hydrogen monitors and then back to containment. Post-accident hydrogen monitoring is described in UFSAR Section 9.14.

Containment pressure monitoring consists of redundant containment pressure signals that are provided to isolate the containment and initiate several reactor safeguard actions. The mechanical portions of containment pressure monitoring provide sensing lines from the containment to the containment pressure monitors. Containment pressure monitoring is described in UFSAR Section 7.5.

The applicant states that the only mechanical portion of post-accident sampling that is within the scope of license renewal is the sample cooler because it forms a part of the CCW pressure boundary. The CCW system is described in UFSAR Section 9.3.

Post-accident hydrogen control provides the means for achieving and maintaining containment post accident hydrogen control. Post-accident hydrogen control is described in UFSAR Section 9.12.

Containment air particulate and gas monitoring measures radioactivity in the containment air. The mechanical portions of containment air particulate and gas monitoring provide a flow path from the containment to the monitors and then back to the containment. Containment air particulate and gas monitoring is described in UFSAR Section 11.2.3.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1, "Plant-Level Scoping," of the LRA. The applicant states that the containment post-accident monitoring and control system is within the scope of license renewal because it contains the following types of SCs:

- SCs that are safety-related and are relied upon to remain functional during and following design-basis events

- SCs that are non-safety-related whose failure could prevent satisfactory accomplishment of the safety-related functions

- SCs that are a part of the Environmental Qualification Program
- SCs that are relied on during station blackout

The intended functions for containment post-accident monitoring and control components subject to an AMR include pressure boundary integrity and throttling.

On the basis of the methodology described above, the applicant identified portions of the containment post-accident monitoring and control system that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-4 of the LRA. Using the methodology described in LRA Section 2.1.2, as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component groupings that are subject to an AMR and identifies their intended functions in Table 3.3-7 of the LRA. The applicant identifies pumps and valves (pressure boundary only), orifices, piping, tubing, and fittings as the component groups that are subject to an AMR.

2.3.2.7.2 Staff Evaluation

The staff reviewed Section 2.3.2.7 of the LRA to determine if the applicant has adequately identified the SCs of the containment post-accident monitoring and control system that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.2.7 of the LRA and in the Turkey Point UFSAR to identify any SCs of the containment post-accident monitoring and control system that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the containment post-accident monitoring and control system that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.2.7 of the LRA.

The applicant identified and listed the SCs subject to AMR for the containment post-accident monitoring and control system in Table 3.3-7 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff subsequently performed a review of the implementation of the methodology for the containment post-accident monitoring and control system by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-4, the applicant lists four detailed flow diagrams, 0-PAMC-01, 0-PAMC-02, 3-PAMC-01, and 4-PAMC-01, of the containment post-accident monitoring and control system. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.3-7 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the containment post-accident monitoring and control system. The staff also sampled portions of

the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

2.3.2.7.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA and information in the Turkey Point UFSAR. On the basis of the review described above, the staff has reasonable assurance that the applicant has adequately identified those portions of the containment post-accident monitoring and control system that are within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3 Auxiliary Systems

2.3.3.1 Intake Cooling Water

In the LRA, Section 2.3.3.1, "Intake Cooling Water," the applicant describes the components that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.6.2 of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.1.1 Summary of Technical Information in the Application

The primary function of the intake cooling water system is to remove heat from CCW and turbine plant cooling water. The intake cooling water pumps supply salt water from the plant's intake structure through two redundant piping headers to the tube side of the CCW and turbine plant cooling heat exchangers. The redundant piping header is provided with isolation valves that can be shut such that failure of one intake cooling loop does not result in immediate shutdown of the unit. Flow of salt water is subsequently routed from these heat exchangers to the plant discharge canal.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the intake cooling water is within the scope of license renewal because it contains:

- SCs that are safety-related and are relied upon to remain functional during and following design basis events,
- SCs that are non-safety-related whose failure could prevent satisfactory accomplishment of the safety-related functions, and
- SCs that are relied on during postulated fires and station blackout events.

The intended functions for intake cooling water components subject to an aging management review are pressure boundary integrity, filtration, structural integrity, structural support, and throttling.

The applicant identifies some of the components associated with the intake cooling water system that are evaluated in another section of the LRA. These components are the CCW heat exchangers (Section 2.3.3.2).

On the basis of its methodology described above, the applicant identified portions of the intake water system that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2, as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component commodity groupings that are subject to an AMR and identifies their intended functions in Table 3.4.1 of the LRA. The applicant identifies the following component groups that are subject to an AMR: pumps, pump expansion joints, basket strainers (shell/internal screen), valves, piping and fittings, orifices, thermowells, and bolting.

2.3.3.1.2 Staff Evaluation

The staff reviewed Section 2.3.3.1of the LRA to determine if the applicant has adequately identified the SCs of the intake cooling water system that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.1 of the LRA and the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the intake cooling water system that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the intake cooling water system that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.1 of the LRA.

The applicant identified and listed the SCs subject to an AMR for the intake cooling water system in Table 3.4-1 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1of this SER. The staff subsequently performed a review of the implementation of the methodology for the intake cooling water system by sampling the SCs that were identified as being within the scope of license renewal but not subject to an AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-5, the applicant lists four detailed flow diagrams, 3-ICW-01, 3-ICW-02, 4-ICW-01, and 4-ICW-02 of the intake cooling water system. The applicant also identifies the mechanical components subject to an AMR and their intended functions in Table 3.4-1 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the intake cooling water system. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

2.3.3.1.3 Conclusions

The staff reviewed the information submitted by the applicant in Section 2.3.3.1 of the LRA and Section 9.6.2 of the UFSAR. On the basis of the review described above, the staff has reasonable assurance that the applicant adequately identified those portions of the intake water

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

2.3.3.2 Component Cooling Water

In the LRA, Section 2.3.3.2, "Component Cooling Water," the applicant describes the components that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.3 of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.2.1 Summary of Technical Information in the Application

The primary function of the CCW system is to remove heat from safety and non-safety related systems and transfer heat to the intake cooling water system during normal and emergency operations. Section 9.3.2 of the Turkey Point Units 3 and 4 UFSAR lists those components for which CCW system provides the heat removal capability.

The CCW system is designed with sufficient redundancy such that a single active failure will not prevent the system from accomplishing its cooling function for safety related equipment.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the CCW is within the scope of license renewal because it contains:

- SCs that are safety related and are relied upon to remain functional during and following design basis events,
- SCs that are non-safety-related whose failure could prevent satisfactory accomplishment of the safety-related functions,
- SCs that are part of the environment qualification program, and
- SCs that are relied on during postulated fires and station balckout events.

The intended functions for CCW components subject to an aging management review are pressure boundary integrity, heat exchanger, and throttling.

The applicant indicates that other coolers and heat exchangers cooled by CCW, as indicated in Section 9.3.2 of the Turkey Point Units 3 and 4 USFAR, are considered part of their respective systems and evaluated in other sections of the LRA.

On the basis of its methodology described above, the applicant identified portions of the CCW system that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2 as specified in 10 CFR 54.21(a)(1) of the LRA, the applicant lists the mechanical component commodity groupings that are subject to an AMR and identifies their intended functions in Table 3.4.2 of the LRA. The applicant identifies the following component groups that are subject to an AMR: pumps and valves (pressure boundary only); piping and fittings; orifices; thermowells; bolting; rotometers; heat exchanger shells and channels, flanges, and doors; CCW tanks; and air reservoirs.

2.3.3.2.2 Staff Evaluation

The staff reviewed Section 2.3.3.2 of the LRA to determine if the applicant has adequately identified the SCs of the CCW system that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.2 of the LRA and the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the CCW system that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the CCW system that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.2 of the LRA.

The applicant identified and listed the SCs subject to AMR for the CCW system in Table 3.4-2 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff subsequently performed a review of the implementation of the methodology for the CCW system by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-5, the applicant lists nine detailed flow diagrams, 3-CCW-01, 3-CCW-02, 3-CCW-03, 3-CCW-04, and 3-CCW-05, 4-CCW-01, 4-CCW-02, 4-CCW-03, and 4-CCW-04 of the CCW system. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.4-2 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the CCW system. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

2.3.3.2.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA and information in Turkey Point Units 3 and 4 USFAR. On the basis of the review described above, the staff has reasonable assurance that the applicant adequately identified those portions of the CCW system that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.3 Spent Fuel Pool Cooling

In the LRA, Section 2.3.3.3, "Spent Fuel Pool Cooling," the applicant describes the components that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.3 and Appendix 14D of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.3.1 Summary and Technical Information in the Application

The primary function of the spent fuel pool (SFP) cooling system is to remove residual heat from fuel assemblies stored in the high-density racks contained in the SFP. The SFP cooling system also filters and demineralizes the water in the pool. The SFP system consists of the cooling, purification, and skimmer loops.

The SFP cooling loop consists of pumps, heat exchanger, filters, demineralizer, piping, and associated valves. The SFP pump draws water from the pool, circulates it through the heat exchanger, which transfers heat to the CCW system, and subsequently returns it to the pool.

The purification loop filters and demineralizes the pool water by circulating a portion of the flow through a filter and demineralizer. The skimmer loop removes dust and debris from the SFP water surface by taking a suction on the skimmer and circulating the water through strainers and filters.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the CCW is within the scope of license renewal because it contains:

- SCs that are safety related and are relied upon to remain functional during and following design basis events,
- SCs that are non-safety related whose failure could prevent satisfactory accomplishment of the safety-related functions, and
- SCs that are relied on during station-blackout events.

The intended functions for the SFP cooling components subject to an aging management review are pressure boundary integrity, heat transfer, and throttling. The applicant also indicates that SFP fuel transfer tubes is discussed in Section 2.4.1.1.2 of the LRA and in Sections 6.6.2.1 and 6.6.3 of Turkey Point Units 3 and 4 USFAR.

On the basis of its methodology described above, the applicant identified portions of the SFP cooling loop that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2, as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component commodity groupings that are subject to an AMR and identifies their intended functions in Tables 3.4.3, 3.6-2, and 3.6-16 of the LRA. The applicant identifies the following component groups that are subject to an AMR: SFP tube blind flanges, pool liner, penetration sleeves, and fuel transfer gate valves, pumps, valves, heat exchanger, and filters, demineralizers, orifices, piping, tubing, and fittings.

2.3.3.3.2 Staff Evaluation

The staff reviewed Section 2.3.3.3 of the LRA to determine if the applicant has adequately identified the SCs of the SFP cooling system that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.3 of the LRA and the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the SFP cooling system that may have been omitted from the scope of license renewal that

meet the scoping criteria in 10 CFR 54.4. The SCs of the SFP cooling system that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.3 of the LRA.

The applicant identified and listed the SCs subject to AMR for the SFP cooling system in Table 3.4-3 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff subsequently performed a review of the implementation of the methodology for the SFP cooling system by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-5, the applicant lists four detailed flow diagrams, 3-SFP-01, 3-SI-01, 4SFP-01, and 4-SI-01 of the SFP cooling system. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.4-3 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the SFP cooling system. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

In a letter to the applicant dated February 2, 2001, the staff requested additional information regarding a SFP vortex diffuser (passive long-live component), which was not included in the scope of license renewal. In its response to the NRC dated March 22, 2001, the applicant confirmed that the SFP vortex diffuser was inadvertently omitted from the LRA, Table 3.4-3. The applicant provided a revised Table 3.4-3 that includes the vortex diffuser, which is subject to an AMR. The Table 3.4-3 also identifies the vortex diffuser's intended function and operating environment. The staff has reviewed additional information provided by the applicant and finds the applicant's response acceptable

2.3.3.3.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA, information in Turkey Point Units 3 and 4 USFAR, and additional information provided by the applicant in the March 22 letter. On the basis of the review described above, the staff has reasonable assurance that the applicant identified those portions of the SFP cooling system that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.4 Chemical and Volume Control

In the LRA, Section 2.3.3.4, "Chemical and Volume Control," the applicant describes the components that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.2 of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.4.1 Summary and Technical Information in the Application

The chemical and control volume system (CVCS) provides a means for injection of boric acid, chemical additions for corrosion control, and reactor coolant cleanup and degasification. The CVCS also adds makeup water to the reactor coolant system, processes reactor coolant letdown, and provides seal water injection to the reactor coolant pump seals.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the CVCS is within the scope of license renewal because it contains:

- SCs that are safety related are relied upon to remain functional during and following design basis events,
- SCs that are non-safety related whose failure could prevent satisfactory accomplishment of the safety-related functions,
- SCs that are part of the Environmental Qualification program and,
- SCs that are relied on during postulated fires and station blackout events.

The applicant also indicates that insulation of the CVCS is not within the scope of license renewal because the system does not contain boric acid solutions at concentration levels that require heat tracing, tank heaters, and piping insulation to prevent boric acid precipiation. The intended functions for the CVCS components subject to an aging management review are pressure boundary integrity, heat transfer, and throttling.

On the basis of its methodology described above, the applicant identified portions of the CVCS that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2, as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component commodity groupings that are subject to an AMR and identifies their intended functions in Tables 3.4.4 of the LRA. The applicant identifies the following component groups that are subject to an AMR: pumps, valves, heat exchangers, tanks, filters, orifices, piping, tubing, bolting, and fittings.

2.3.3.4.2 Staff Evaluation

The staff reviewed Section 2.3.3.4 of the LRA to determine if the applicant has adequately identified the SCs of the CVCS that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.4 of the LRA and the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the CVCS that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the CVCS that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.4 of the LRA.

The applicant identified and listed the SCs subject to AMR for the CVCS in Table 3.4-4 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff subsequently performed a review of the implementation of the methodology for the CVCS by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended

functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-5, the applicant lists eight detailed flow diagrams, 0-CVCS-01, 0-CVCS-02, 3-CVCS-01, 0-CVCS-02, O-CVCS-03, 4-CVCs-01, 4-CVCS-02, and 4-CVCS-03 of the CVCS. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.4-4 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the CVCS. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

In a letter to the applicant dated February 2, 2001, the staff requested additional information regarding the LRA boundary of the relief and drain lines of the CVCS holdup tanks that normally end at a valve or a component to provide the system isolation function. In its response to the NRC dated March 22, 2001, the applicant states that the CVCS holdup tanks serve as collection points for water from the reactor coolant system to meet the requirement of 10 CFR 50 Appendix R for safe shutdown. The boundary depicted on drawing 0-CVCS-02 illustrates the required flowpath from the reactor coolant system to the CVCS holdup tanks. The inventory inside these tanks, however, is not required to perform or support any license renewal system intended functions and therefore, does not satisfy the 10 CFR 54.4 criteria. The associated relief and drain lines and valves do not perform or support any license renewal system intended functions that satisfy the CFR 54.4 criteria. The applicant concludes that these lines are not within the scope of license renewal and therefore do not have to be extended to the nearest valve or component that provides the system isolation function. The staff has reviewed the additional information provided by the applicant and finds the applicant's response acceptable.

2.3.3.4.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA, information in Turkey Point Units 3 and 4 USFAR, and additional information provided by the applicant in the March 22, 2001 letter. On the basis of the review described above, the staff has reasonable assurance that the applicant identified those portions of the CVCS that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.5 Primary Water Makeup

In the LRA, Section 2.3.3.5, "Primary Water Makeup," the applicant describes the components that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.6.2 of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.5.1 Summary and Technical Information in the Application

The primary function of the primary water makeup is to supply unborated, demeneralized, and deaerated water to the reactor coolant system during plant normal operating conditions. There

are two primary water makeup pumps per unit. These pumps take suction from the primary water storage tank and inject water into the reactor coolant system via the CVCS charging line. The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the CVCS is within the scope of license renewal because it contains:

- SCs that are relied on during postulated fires and station blackout events,
- SCs that are safety related and are relied upon to remain functional during and following design basis events, and
- SCs that are non-safety related whose failure could prevent satisfactory accomplishment of the safety-related functions.

The intended function for primary water makeup components subject to an aging management review is pressure boundary integrity.

On the basis of its methodology described above, the applicant identified portions of the primary water makeup system that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2, as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component commodity groupings that are subject to an AMR and identifies their intended functions in Tables 3.4.5 of the LRA. The applicant identifies the following component groups that are subject to an AMR: valves, piping, tubing, bolting, and fittings.

2.3.3.5.2 Staff Evaluation

The staff reviewed Section 2.3.3.5 of the LRA to determine if the applicant has adequately identified the SCs of the primary water makeup system that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.5 of the LRA and the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the primary water makeup system that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the primary water makeup system that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.5 of the LRA.

The applicant identified and listed the SCs subject to AMR for the primary water makeup system in Table 3.4-5 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1of this SER. The staff subsequently performed a review of the implementation of the methodology for the primary water makeup system by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-5, the applicant lists six detailed flow diagrams, 3-PW-01, 3-RCS-03, 3-CVCS-01, 4-PW-01, 4-RCS-03, and 4-CVCS-01 of the primary water makeup system. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.4-5 of the LRA. The detailed flow diagrams were highlighted to identify

those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the primary water makeup system. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

2.3.3.5.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA and information in the Turkey Point Units 3 and 4 UFSAR. On the basis of the review described above, the staff has reasonable assurance that the applicant adequately identified those portions of the primary water makeup system that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.6 Sample Systems

In the LRA, Section 2.3.3.6, "Sample Systems," the applicant describes the components of the sample systems that are within the scope of license renewal and subject to an AMR. These systems are further described in Section 9.4 of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.6.1 Summary of Technical Information in the Application

The sample systems consist of two subsystems: Sample System — Nuclear Steam Supply System and Sample System — Secondary. Both subsystems are designed to operate manually, on an intermittent basis. Samples can be obtained under conditions ranging from full power to cold shutdown.

The Sample System — Nuclear Steam Supply System permits remote sampling of fluids of the primary plant systems. The subsystem is used to evaluate fluid chemistry in the RCS, ECCS, and CVCS.

The Sample System — Secondary permits remote sampling of fluids of the secondary systems. The subsystem is used to evaluate fluid chemistry in the feedwater, condensate/condenser hotwell, steam generator blowdown, main steam, and heater drain systems.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the sample systems are in the scope of license renewal because they contain:

- SCs that are safety related and are relied upon to remain functional during and following design basis events
- SCs that are non-safety related whose failure could prevent satisfactory accomplishment of the safety-related functions
- SCs that are a part of the Environmental Qualification Program

- SCs that are relied on during postulated fires, anticipated transients without scram, and station blackout events

The intended functions for sample systems components subject to an aging management review include pressure boundary integrity and throttling.

On the basis of its methodology described above, the applicant identified portions of the sample systems that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2, "Component/Structural Component Scoping and Screening," as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component groupings that are subject to an AMR and identifies their intended functions in Table 3.4-6 of the LRA. The applicant identifies the following component groups that are subject to an AMR: valves and coolers (pressure boundary only), piping, tubing, and fittings.

2.3.3.6.2 Staff Evaluation

The staff reviewed Section 2.3.3.6 of the LRA to determine if the applicant has adequately identified the SCs of the sample systems that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.6 of the LRA and in the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the sample systems that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the sample systems that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.6 of the LRA.

The applicant identified and listed the SCs subject to AMR for the sample systems in Table 3.4-6 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff subsequently performed a review of the implementation of the methodology for the sample systems by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

The staff found one potential discrepancy in Table 3.4-6, on page 3.4-40, under "Secondary Sample System - External Environment." The second line indicates valves and piping/fittings with an intended function as pressure boundaries, made of carbon steel, and exposed to an external environment described as "indoor - not air conditioned" (and also "containment air," which is not pertinent). Under the heading "Aging Effects Requiring Management," it indicates "None," meaning there is no program/activity required to monitor aging effects.

However, in several other systems described in the LRA, the same kinds of components, with the same intended function, material, and environment, show the aging effect "Loss of Material," to be monitored under the Systems and Structures Monitoring Program.

Nonetheless, additional staff review found that the SCs in question were close to the containment wall and to the steam systems, and therefore would be hot. The LRA, in

Appendix C, "Process for Identifying Aging Effects Requiring Management For Non-Class 1 Components," Section 5.1, "Loss of Material," states:

> Carbon and low alloy steels are susceptible to external general corrosion in all areas with the exception of those exposed to a controlled, air-conditioned environment, and those applications where the metal temperature is greater than 212 °F.

The staff concludes that the subject SCs operate at a hot (212 °F) temperature and therefore agrees with the applicant that they are not subject to AMR.

In the LRA, Table 2.3-5, the applicant lists 20 detailed flow diagrams of the sample systems. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.4-6 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the sample systems. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

2.3.3.6.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA and information in the Turkey Point Units 3 and 4 UFSAR. On the basis of the review described above, the staff has reasonable assurance that the applicant adequately identified those portions of the sample systems that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.7 Waste Disposal

In the LRA, Section 2.3.3.7, "Waste Disposal," the applicant describes the components of the waste disposal system that are within the scope of license renewal and subject to an AMR. This system is further described in Section 11.1 of the Turkey Point Units 3 and 4 UFSAR.

2.3.3.7.1 Summary of Technical Information in the Application

The waste disposal system collects and processes potentially radioactive reactor plant wastes prior to release or removal from the plant site. The system is common to Units 3 and 4 except for the components associated with each containment. Waste disposal consists of three subsystems: liquid, solid, and gaseous waste disposal systems.

The applicant describes its methodology for identifying the mechanical components within the scope of license renewal in Section 2.1.1 of the LRA. The applicant states that the waste disposal system is in the scope of license renewal because it contains:

- SCs that are safety related and are relied upon to remain functional during and following design basis events

- SCs that are non-safety related whose failure could prevent satisfactory accomplishment of the safety-related functions
- SCs that are a part of the Environmental Qualification Program
- SCs that are relied on during postulated fires and station blackout events

The intended function for waste disposal components subject to an aging management review is pressure boundary integrity.

On the basis of its methodology described above, the applicant identified portions of the waste disposal system that are evaluated within the scope of the LRA and are shown on the flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2 as specified in 10 CFR 54.21(a)(1), the applicant lists the mechanical component groupings that are subject to an AMR and identifies their intended functions in Table 3.4-7 of the LRA. The applicant identifies the following component groups that are subject to an AMR: pumps, valves, and heat exchangers (pressure boundary only), piping, tubing, and fittings.

2.3.3.7.2 Staff Evaluation

The staff reviewed Section 2.3.3.7 of the LRA to determine if the applicant has adequately identified the SCs of the waste disposal system that are within the scope of license renewal and are subject to an AMR in accordance with 10 CFR 54.4(a), and 10 CFR 54.21(a)(1), respectively. The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.7 of the LRA and in the Turkey Point Units 3 and 4 UFSAR to identify any SCs of the waste disposal system that may have been omitted from the scope of license renewal that meet the scoping criteria in 10 CFR 54.4. The SCs of the waste disposal system that meet the license renewal scoping criteria are included within the scope of license renewal and are identified as such by the applicant in Section 2.3.3.7 of the LRA.

The applicant identified and listed the SCs subject to AMR for the waste disposal system in Table 3.4-7 of the LRA using the screening methodology described in Section 2.1.2 of the LRA. The staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The staff subsequently performed a review of the implementation of the methodology for the waste disposal system by sampling the SCs that were identified as being within the scope of license renewal but not subject to AMR to verify that these SCs performed the intended functions with moving parts or with a change in configuration or properties, or are subject to replacement based on qualified life or specified time period.

In the LRA, Table 2.3-5, the applicant lists six detailed flow diagrams, 0-WD-01, 0-WD-02, 3-WD-01, 3-RCS-02, 4-WD-01, and 4-RCS-02, of the waste disposal system. The applicant also identifies the mechanical components subject to AMR and their intended functions in Table 3.4-7 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system that were included within the scope of license renewal. The applicant highlighted those components, which it believes perform at least one of the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure that they were representative of the waste disposal system. The staff also sampled portions of the flow diagrams that were not highlighted to ensure these components did not perform any of the functions as defined in 10 CFR 54.4(b).

2.3.3.7.3 Conclusions

The staff reviewed the information submitted by the applicant in the LRA and information in the Turkey Point Units 3 and 4 UFSAR. On the basis of the review described above, the staff has reasonable assurance that the applicant adequately identified those portions of the waste disposal system that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.8 Instrument Air

In Section 2.3.3.8, "Instrument Air," of the LRA, the applicant described the components of the instrument air system that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.17 of the Turkey Point UFSAR.

2.3.3.8.1 Technical Information in the Application

The function of the instrument air system is to provide a reliable supply of dry, oil-free, compressed air for pneumatic equipment operation. Instrument air provides motive power and control air to safety-related and nonsafety-related components. For each unit, the instrument air system employs a motor-driven compressor as the primary source of compressed air, with a diesel-driven compressor as the back-up source. Each compressor is capable of supplying sufficient air for both Unit 3 and Unit 4, and the system is normally run in a cross-tied configuration. One motor-driven compressor normally supplies both units. On a loss of pressure, the opposite motor-driven compressor will pick up the load. On a loss of power to the motor-driven compressors, either of the diesel-driven compressors can supply sufficient air for both units.

The applicant described the process for identifying the mechanical components within the scope of license renewal in LRA Section 2.1.2.1, "Mechanical Systems." The applicant identified the portions of the instrument air system that are within the scope of license renewal on flow diagrams listed on Table 2.3-5 of the LRA. Using the methodology described in LRA Section 2.1.2, the applicant compiled a list of mechanical component/commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The applicant listed these components/groups in Table 3.4-8 of the LRA. The applicant identified nine component/ commodity groups as subject to an AMR: valves (pressure boundary only), flasks/tanks, filters, strainers, heat exchangers, orifices, piping, tubing, and fittings. The intended functions of these components include pressure boundary integrity, heat transfer, filtration, and throttling.

2.3.3.8.2 Staff Evaluation

The staff reviewed Section 2.3.3.8 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the instrument air system components and supporting structures within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1). The staff reviewed the text and diagrams submitted by the licensee in Section 2.3.3.8 of the LRA and the Turkey Point UFSAR to identify if there were portions of the system piping and other components that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those portions of the instrument air system that perform at

least one intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.3.3.8 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the instrument air system that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional system functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff found no omissions by the applicant. Therefore, there is reasonable assurance that the applicant adequately identified all portions of the instrument air system that fall within the scope of license renewal in accordance with 10 CFR Part 54.4.

The staff determined whether the applicant had properly identified the SCs subject to an AMR from among those identified as within scope of license renewal. The applicant identified and listed the SCs subject to an AMR for the instrument air system in Table 3.4-8 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling SCs that were within the scope of license renewal but not subject to an AMR to verify that these SCs performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

In the LRA, the applicant listed fifteen detailed flow diagrams for the instrument air system on Table 2.3-5 of the LRA and identified the mechanical components subject to an AMR and their intended functions in Table 3.4-8 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system within the scope of license renewal. The applicant highlighted those components which they believe perform at least one intended function meeting the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure they were representative of the instrument air system. The staff sampled portions of the flow diagrams that were not highlighted to ensure these components did not have any intended functions defined in 10 CFR 54.4.

On the basis of this review, the staff questioned why instrument air compressor No. 4S and associated piping were not included within the scope of the license renewal application. In a letter dated January 17, 2001, the staff issued RAI 2.3.3.8-1 regarding these components in the instrument air system. In a letter dated February 16, 2001, the applicant responded to the RAI. The applicant stated that the 4S compressor has been abandoned in place and its discharge valve (4-40-775) has been administratively tagged closed pending formal abandonment. Thus, the compressor and its associated piping are isolated from the rest of the instrument air system and perform no intended function within the scope of license renewal. The staff reviewed the applicant's response to RAI 2.3.3.8-1 and found the applicants justification acceptable.

2.3.3.8.3 Conclusions

On the basis of the staff's review of the information contained in Section 2.3.3.8 of the application, the February 16, 2001, response to the staff's information request, and the supporting information in the Turkey Point UFSAR, as discussed in the preceding section, the staff did not find any omissions by the applicant and, therefore, concludes that there is

reasonable assurance that the applicant adequately identified those portions of the instrument air system that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.3.9 Normal Containment and Control Rod Drive Mechanism Cooling

In Section 2.3.3.9, "Normal Containment and Control Rod Drive Mechanism Cooling," of the LRA, the applicant described the components of these cooling systems that are within the scope of license renewal and subject to an AMR. This system is further described in Section 9.10 of the Turkey Point UFSAR.

2.3.3.9.1 Technical Information in the Application

The function of the normal containment cooling system is to provide air circulation and cooling to maintain the containment bulk ambient temperature below design limits during normal operation. The control rod drive mechanism cooling system supplements the normal containment cooling system by removing heat from the control rod drive mechanisms. Neither system is safety-related but the control rod drive mechanism cooling fans are fed from vital motor control centers and can be manually loaded onto the emergency diesel generators (EDGs) under specified conditions, and can be used to remove heat from the reactor vessel head during natural circulation conditions.

The applicant described the process for identifying the mechanical components within the scope of license renewal in LRA Section 2.1.2.1, "Mechanical Systems." The applicant identified the portions of the normal containment cooling and control rod drive mechanism cooling systems that are within the scope of license renewal on flow diagrams listed on Table 2.3-5 of the LRA. Using the methodology described in Section 2.1.2 of the LRA, the applicant compiled a list of mechanical component/commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The applicant listed these components/groups in Table 3.4-9 of the LRA. The applicant identified seven component/commodity groups as subject to an AMR: cooler housings, cooler headers, cooler tubes, cooler fins, duct work, duct work flexible connectors, and bolting. The intended functions of these components include system pressure boundary integrity, and heat transfer. In addition, the cooler housings provide structural support for the safety-related CCW system pressure boundary.

2.3.3.9.2 Staff Evaluation

The staff reviewed Section 2.3.3.9 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the normal containment and control rod drive mechanism cooling system components and supporting structures within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and diagrams submitted by the licensee in Section 2.3.3.9 of the LRA and the Turkey Point UFSAR to identify if there were portions of the system piping and other components that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those portions of the normal containment cooling and control rod drive mechanism cooling systems that perform at least one intended function are

included within the scope of license renewal and are identified as such by the licensee in Section 2.3.3.9 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the cooling systems that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional system functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff found no omissions by the applicant. Therefore, there is reasonable assurance that the applicant adequately identified all portions of the normal containment and control rod drive mechanism cooling systems that fall within the scope of license renewal in accordance with 10 CFR Part 54.4.

The staff determined whether the applicant had properly identified the SCs subject to an AMR from among those identified as within the scope of license renewal. The applicant identified and listed the SCs subject to an AMR for the normal containment and control rod drive mechanism cooling systems in Table 3.4-9 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling SCs that were within the scope of license renewal but not subject to an AMR to verify that these SCs performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

In the LRA, the applicant listed two detailed flow diagrams for the normal containment and control rod drive mechanism cooling systems on Table 2.3-5 of the LRA and identified the mechanical components subject to an AMR and their intended functions in Table 3.4-9 of the LRA. The detailed flow diagrams were highlighted to identify those portions of the system within the scope of license renewal. The applicant highlighted those components which they believe perform at least one intended function meeting the scoping requirements of 10 CFR 54.4. The staff compared the LRA flow diagrams to the system drawings and descriptions in the UFSAR to ensure they were representative of the normal containment and control rod drive mechanism cooling systems. The staff sampled portions of the flow diagrams that were not highlighted to ensure these components did not have any intended functions defined in 10 CFR 54.4.

On the basis of this review, the staff identified two components that were not included in the scope of license renewal: 1) the 1-inch stainless steel tubing from the containment cooler header to the containment air monitor, and 2) the sample lines from the control rod drive mechanism coolers to the radiation sampler/detector. During conference calls on December 21, 2000, and January 9, 2001, the staff discussed this issue with the applicant. The applicant clarified that the containment air monitor and the radiation sampler/detector do not perform any intended functions within the scope of license renewal, and neither the control rod drive cooling system nor the normal containment cooling system would be impacted by a break at these locations because the lines are small in relation to the total volume of the system. With this clarification, the staff agrees with the application description that these two components are not within the scope of license renewal.

2.3.3.9.3 Conclusions

On the basis of the staff's review of the information contained in Section 2.3.3.9 of the application, clarifications provided in the December 21, 2000, and January 9, 2001, conference calls, and the supporting information in the Turkey Point UFSAR, as discussed in the preceding section, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the normal containment and control rod drive mechanism cooling systems that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.3.3.10 Auxiliary Building Ventilation

In LRA Section 2.3.3.10, "Auxiliary Building Ventilation," the applicant identified portions of the auxiliary building ventilation system (ABVS) and the components that are within the scope of license renewal and subject to an AMR. The applicant stated in Section 2.3.3.10 of the LRA that additional information for the ABVS is provided in Section 9.8.1 of the UFSAR. The system scoping is shown in ABVS evaluation boundary flow drawings 0-ABVAC-01, Rev. 0, and 0-ABVAC-02, Rev. 0, for Units 3 and 4 and listed in Table 2.3-5 of the LRA.

The applicant evaluated component supports for equipment, piping, heating, ventilation, and air conditioning (HVAC) ducts, and fan/filter intake hoods that are associated with the ABVS in Section 3.6.2 and Table 3.6-3 of the LRA. The applicant also evaluated electrical components that support the operation of the ABVS in Section 2.5 of the LRA. The staff evaluated component supports in the section on the auxiliary building structures and electrical components in Section 2.5 of this SER. The instrument lines are individually highlighted as being within the scope of license renewal on flow diagrams 0-ABVAC-01, Rev. 0, and 0-ABVAC-02, Rev. 0. The applicant evaluated instrument line components within the ABVS in Section 2.3.3.10 of the LRA.

2.3.3.10.1 Technical Information in the Application

The auxiliary building is a reinforced concrete structure that houses safety-related SSCs. The ABVS provides adequate heat removal to ensure proper operation of safety-related equipment in the auxiliary building. The ABVS includes the electrical equipment room ventilation (EERV) system. The ABVS is common to Units 3 and 4. The system provides clean air to the operating areas of the auxiliary building and exhausts air from the equipment rooms and open areas of the auxiliary building. The ABVS is described in UFSAR Section 9.8.1.

The EERV system is the same for Turkey Point Units 3 and 4. The EERV system provides cooling for the electrical equipment room (EER) under normal and emergency conditions. During normal operations, non-safety-related chillers maintain the desired room temperature. In the event of a failure of the non-safety-related system or loss of offsite power (LOOP), safety-related air conditioners will perform the same function. The EERV is described in UFSAR Section 9.8.2.

The ABVS provides clean air to the operating areas of the auxiliary building. The system exhausts air from the equipment rooms and open areas of the auxiliary building and the Unit 4 spent fuel storage pit through a closed system. The exhaust system includes a 100 percent

capacity bank of high-efficiency particulate air (HEPA) filters, and two 100 percent capacity fans discharging to the atmosphere via the plant vent. A separate fan exhausts air from the Unit 3 spent fuel area through HEPA filters to its own vent and is not connected to the ABVS. Radiation monitoring is provided to monitor gases and particles discharged from the spent fuel vents. These arrangements ensure the proper direction of air flow for removal of potential airborne radioactivity from the auxiliary building and spent fuel areas.

The ABVS provides a minimum of five air exchanges per hour for each of the rooms and open areas of the building. This assures adequate heat removal from operating equipment. Operation of this system would be interrupted by a loss of normal power supplies, as the main supply and exhaust fans are not vital to the operation of engineered safety features. These fans can be manually loaded onto the EDGs.

ABVS and EERV system components subject to an AMR include air handlers (pressure boundary only), filters, ductwork, tubing, and fittings. The intended function of ABVS and EERV system components subject to an AMR is to maintain pressure boundary integrity. The ABVS and EERV system components that require an AMR and their intended functions are listed in Table 3.4-10 of the LRA. The AMR for the ABVS and EERV systems is discussed in Section 3.4 of the LRA.

In LRA Section 2.3.3.10 and Sections 9.8.1 and 9.8.2 of the UFSAR, the applicant identified the following intended functions for the ABVS, consistent with 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2).

Section 2.3.3.10 of the LRA -

- Provide adequate heat removal to ensure proper operation of safety-related equipment in the auxiliary building.
- Provide clean air to the operating areas of the auxiliary building and exhaust air from the equipment rooms and open areas of the auxiliary building.
- Provide cooling for the EER under normal and emergency conditions.
- Maintain the desired room temperature during normal operations (non-safety-related chillers).

Section 9.8.1 of the UFSAR -

- Ensure adequate heat removal from equipment rooms and open areas.
- Control direction of flow of potential airborne radioactivity from areas of low activity through areas of higher activity to the common ventilation exhaust.
- Maintain a temperature-controlled environment for the safety-related equipment located within EERs.

On the basis of the intended functions identified above for the ABVS, the applicant determined that all ABVS safety-related and non-safety-related components (electrical, mechanical, and

instrument) are within the scope of license renewal. The applicant described its methodology for identifying the mechanical components that are subject to an AMR in Section 3.4, "Auxiliary Systems," of the LRA. The applicant uses this methodology to identify the portions of the ABVS that are within the scope of license renewal, and that are highlighted on flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical component and components types that are within the scope of license renewal and subject to an AMR. The applicant provided this list in Table 3.4-10 of the LRA.

Specifically, the applicant identified the following device types as being within the scope of license renewal and subject to an AMR:

- For the internal environment: auxiliary building ventilation air handler housings (carbon steel, galvanized), auxiliary building ventilation prefilters and roughing filter housings (carbon steel, galvanized), ductwork (carbon steel, galvanized), pressure test point plugs (carbon steel, galvanized), tubbing and fittings (stainless steel), and flexible connectors (coated canvas)

- For the external environment: auxiliary building ventilation air handler housings (carbon steel, galvanized), auxiliary building ventilation prefilters and roughing filter housings (carbon steel, galvanized), ductwork (carbon steel, galvanized), pressure test point plugs (carbon steel, galvanized), tubbing and fittings (stainless steel), and flexible connectors (coated canvas), and bolting, (carbon steel)

The applicant further noted in Table 3.4-10 in the LRA that the ABVS pressure boundary and heat transfer functions are the only applicable intended functions associated with the ABVS components that are subject to an AMR.

2.3.3.10.2 Staff Evaluation

The NRC staff reviewed the above information to verify that the applicant identified the components of the ABVS that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff also reviewed the information in the UFSAR Section 9.8. After completing the initial review, the NRC staff issued a RAI by letter dated December 22, 2000, regarding the ABVS. The applicant responded to the RAI by letters dated January 19, 2001, and July 18, 2001.

In LRA, Section 2.1, "Scoping and Screening Methodology," the applicant discusses the process for identifying mechanical components that are subject to an AMR. The NRC staff evaluates the applicant's methodology in Section 2.1 of this SER, "Scoping and Screening Methodology."

In its review of the ABVS, the NRC staff reviewed the drawings listed in LRA Table 2.3-5 (which show the evaluation boundaries for the highlighted portion of the ABVS that are within the scope of license renewal) and Table 3.4-10 (which lists the mechanical components and applicable intended functions that are subject to an AMR).

The NRC staff also reviewed UFSAR Section 9.8 to determine if there were any portions of the ABVS that met the scoping criteria in 10 CFR 54.4(a) but were not identified as being within the

scope of license renewal. The staff also reviewed the UFSAR to determine if there were any safety-related system functions that were not identified as intended function(s) in the LRA and to determine if there were any SCs that have intended functions that might have been omitted from the scope of SCs that are subject to an AMR. The staff also reviewed the system flow diagrams identified in Table 2.3-5 of the LRA to determine if any SCs within the evaluation boundaries were omitted from the scope of components that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). The NRC staff compared the functions described in the UFSAR to those identified in the LRA. The NRC staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those identified as being within the scope of license renewal.

The applicant identified the SCs subject to an AMR for the ABVS using the screening methodology described in Section 2.1 of the LRA and listed them in Table 3.4-10 of the LRA. The NRC staff evaluated the scoping and screening methodology and documented its findings in Section 2.1 of this SER. The NRC staff sampled the SCs listed in Table 3.4-10 of the LRA to verify that the applicant accurately identified the SCs that are subject to an AMR. The staff also sampled the SCs that the applicant identified as being within the scope of license renewal but not subject to an AMR to verify that the SCs perform their intended functions with moving parts or with a change in configuration or properties and are subject to replacement on the basis of a qualified life or specified time period.

To help ensure that those portions of the ABVS that the applicant identifies as not being within the scope of license renewal do not perform any of the functions identified in 10 CFR 54.4, the NRC staff requested additional information on the basis of the information in the UFSAR and LRA. The NRC staff noted that LRA Section 2.3.3.10 presents a summary description of the system functions, the Table 2.3-5 flow diagrams highlight the evaluation boundaries of the ABVS, and Table 3.4-10 tabulates the ABVS components that are within the scope of license renewal and subject to an AMR. The corresponding drawings for these systems in the UFSAR, however, show additional components that were not listed in Table 3.4-10 of the LRA.

The NRC staff requested specific information concerning the exclusion of the following components from the scope of license renewal and/or from an AMR:

- housings for dampers, diffusers, fans, exhausts hoods, louvers, sealant materials, and the bird screen for the plant stack.

- ductwork from the plant stack dampers MO-3419 and MO-3420, and ductwork from the containment purge, radwaste building, Unit 4 SFP, and new fuel storage area to the plant stack.

In a letter dated January 19, 2001, the applicant provided a response to RAI 2.3.3.10-1. Auxiliary building and EERV fans and dampers, including their housings, were evaluated to determine whether these components should be included in an AMR. The evaluation determined that several of these components, e.g., the auxiliary building supply and exhaust fans and their associated dampers, support license renewal system intended functions that satisfy the scoping criteria in 10 CFR 54.4 and are within the scope of license renewal. However, fans and dampers were determined to be active components and not subject to an AMR consistent with 10 CFR 54.21(a)(1)(i) and the guidance of Appendix B to NEI 95-10, Revision 2.

The staff requested clarification or justification in RAI 2.3.3.10-1 concerning the exclusion of the ABVS housing for dampers, diffusers, fans, exhaust hoods, and louvers from the scope of license renewal or an AMR in accordance with the requirements of 10 CFR 54.4(a)(1), 10 CFR 54.4(a)(2), 10 CFR 54.4(a)(3) and 10 CFR 54.21(a)(1)(i).

In a letter dated July 18, 2001, the applicant provided additional clarifying information stating that the housings for dampers and fans have been included in the AMR for the auxiliary building and EERV as part of Table 3.4-10 of the LRA. Auxiliary building penthouse louver and two exhaust hoods for the radioactive and cold chemistry laboratories and diffusers were evaluated and determined not to be within the scope of license renewal since they are not safety related and do not support any intended functions that satisfy the scoping criteria in 10 CFR 54.4.

On the basis of the additional information provided by the applicant, the NRC staff determined that it is acceptable to exclude the housings, for louvers, exhaust hoods, and diffusers from the scope of license renewal because they do not meet the scoping criteria in 10 CFR 54.4.

The applicant stated that the sealant materials within the scope of license renewal are addressed as structural components and require an aging management review as described in Subsection 3.6.2.4 (page 3.6-42) and listed in Table 3.6-3 (page 3.6-58) of the LRA. The NRC staff reviewed the applicant's response for sealant materials and found the response to be acceptable and consistent with the applicable requirements of 10 CFR 54.21 and 10 CFR 54.4. Sealant materials are within the scope of license renewal and are subject to an AMR as described in Subsection 3.6.2.4 and listed in Table 3.6-3 of the LRA.

The applicant clarified that there are no bird screens associated with the plant vent stack.

The NRC staff agrees with the applicant's clarification regarding louver and exhaust hoods and determines that it is acceptable to exclude these from the scope of license renewal because they do not meet the scoping criteria in 10 CFR 54.4.

In response to the staff's RAI, the applicant provided the following justification for the exclusion of specific exhaust ductwork from license renewal and an AMR.

As described in Subsection 2.3.3.10 (page 2.3-29) of the LRA, the license renewal system intended function of the ABVS is to provide adequate heat removal to ensure proper operation of safety-related equipment in the auxiliary building. The pressure boundary of the ventilation system in the auxiliary building is relied upon to exhaust the ventilation air out of the building. The pressure boundary of the ductwork outside the auxiliary building (exhaust ductwork from dampers MO-3419 and MO-3420 to plant stack, [@A2 and C2]) is not required to support the license renewal system intended function and therefore does not meet the scoping criteria of 10 CFR 54.4 and is not within the scope of license renewal.

The radwaste building, Unit 4 SFP, and new fuel storage area ventilation systems, including the ductwork to the plant vent stack, do not support any license renewal system intended functions that satisfy the scoping criteria of 10 CFR 54.4. Therefore, these systems (including exhaust ductwork to the plant vent stack) are not within the scope of license renewal, as shown in Table 2.2-1 (page 2.2-2) of the LRA. The only license renewal intended function for containment purge is containment isolation, as described in Subsection 2.3.2.3 (page 2.3-15) of

the LRA (see drawings 3-CP-01 and 4-CP-01). Therefore, the exhaust ductwork from the outboard containment isolation valves to the plant vent stack is not within the scope of license renewal and does not require an aging management review.

The NRC staff reviewed the applicant's response for the explanation of the exclusion of the exhaust ductwork from license renewal and an AMR and agrees with the applicant's clarification.

The NRC staff reviewed information provided by the applicant in a letter dated January 19, 2001, in response to an RAI 2.3.3.10-2 regarding the exclusion of exhaust ductwork from the radwaste building, Unit 4 SFP, and new fuel storage area ventilation to the plant stack from license renewal and an AMR. The staff reviewed the evaluation boundary drawing and compared the system and intended functions. The staff agrees with the applicant's response that the pressure boundary of the ventilation system in the auxiliary building is relied upon to exhaust the ventilation air out of the building. Therefore the pressure boundary of the exhaust ductwork outside the auxiliary building does not require an AMR because outside exhaust ductwork does not meet the scoping criteria in 10 CFR 54.4(a).

Some components that are common to many systems, including the ABVS, have been separately evaluated in the LRA together with similar components from other systems as separate commodity groups, and are evaluated by the NRC staff in other sections throughout this SER.

In Section 2.4 of the SER the staff evaluated component supports for piping, cables, and equipment, which are discussed in LRA Section 2.4, "Scoping and Screening Results - Structures." In Section 2.5 of the SER, the staff evaluated the electrical components that support the operation of the ABVS; these components are discussed in LRA Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls (I&C)". The ABVS instrumentation lines are listed as "tubing" in Table 3.4-10 of the LRA.

The NRC staff reviewed the LRA, supporting information in the UFSAR, and the applicant's responses to the staff's RAI. In addition, the NRC staff sampled several components from the ABVS flow diagrams (Table 2.3-5 of the LRA) to determine whether the applicant properly identified the components that are within the scope of license renewal, and subject to an AMR. No omissions were identified.

2.3.3.10.3 Conclusion

On the basis of this review the staff has reasonable assurance that the applicant has adequately identified the ABVS components that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 54.21, respectively.

Section 2.3.3.11 Control Building Ventilation

In LRA Section 2.3.3.11, "Control Building Ventilation," the applicant identified portions of the control building ventilation system (CBVS) and its components that are within the scope of license renewal and subject to an AMR. The applicant stated in Section 2.3.3.11 of the LRA that the CBVS is further described in Section 9.9 of the UFSAR. The system scoping is shown

in CRVS evaluation boundary flow drawings 0-CBVAC-01, Rev. 0, 0-CBVAC-02, Rev. 0, and 0-CBVAC-03, Rev. 0, for Units 3 and 4 and listed in Table 2.3-5 of the LRA.

The applicant evaluated component supports for the HVAC system that is associated with the CBVS in Section 3.6.2 and Table 3.6-5 of the LRA. The applicant also evaluated electrical components that support the operation of the CBVS in Section 2.5 of the LRA. The staff evaluated component supports in the section on the control building structures and electrical components in Section 2.5 of this SER. The instrument lines are individually highlighted as being within the scope of license renewal on flow diagrams 0-CBVAC-01, Rev. 0, 0-CBVAC-02, Rev. 0, and 0-CBVAC-03, Rev. 0. The applicant evaluated instrument line components with the CBVS in Section 2.3.3.11 of the LRA.

2.3.3.11.1 Technical Information in the Application

The control building is a three-story reinforced concrete structure housing safety-related SSCs. The control building walls and roof are designed to withstand missile effects. The CBVS provides a temperature-controlled environment to ensure proper operation of equipment in the control building. The CBVS is composed of three subsystems: the control room ventilation system; the computer/cable spreading room ventilation system; and the DC equipment/inverter room ventilation system. These subsystems are common to Turkey Point Units 3 and 4.

The CBVS circulates air from the control room and offices through roughing filters to the air handling units. Conditioned air is returned and distributed throughout the control room. The control room ventilation system (CRVS) maintains the habitability of the control room following design basis events. The control room ventilation system is described in Section 9.9.1 of the UFSAR.

The computer/cable spreading room ventilation system maintains the temperature and humidity requirements of the vital electrical equipment installed in the computer and cable spreading rooms. It also provides sufficient ventilation for intermittent occupancy by operations and maintenance personnel. The computer/cable spreading room ventilation system is described in UFASR Section 9.9.3.

The DC equipment/inverter room ventilation system provides cooling to the rooms that house the safety-related battery banks, battery chargers, inverters, and DC load centers. The DC equipment/inverter room ventilation system is described in UFASR Section 9.9.2.

The flow diagrams listed in Table 2.3-5 show the evaluation boundaries for the portions of CBVS that are within the scope of license renewal.

Control Room Ventilation System

All three HVAC units of CRVS are powered by swing power sources, each of which can be powered by the EDGs. One HVAC unit is powered by motor control center (MCC) 3D, one unit by MCC 4D, and the third unit is powered via a transfer switch which automatically transfers between MCCs 3B and 4B. This configuration precludes the loss of more than one HVAC unit for any postulated single failure. Control room equipment is designed to operate in an environment of 120 °F and 95 percent relative humidity. If two of three units were inoperative, the third would maintain the environment within these limits.

The CRVS has two emergency modes of operation: (1) one automatic, upon receipt of applicable signals associated with a potential radiological exposure; and (2) the other manually initiated. The automatically initiated mode provides pressurization using a limited quantity of outside air drawn through a charcoal filter system. Without pressurization, in-leakage in excess of radiological limits could occur. No requirement currently exists for the complete isolation provided by the manually initiated mode, since no concerns related to chemical releases have been identified for the site. Following initiation of the control room emergency mode all exhaust fans are shut off, and redundant exhaust isolation dampers in series are closed. Redundant normal air intake dampers in parallel are opened. Likewise, the recirculation air path is opened. A single air supply fan is energized to move the appropriate mixture of recirculating control room air and new outdoor air through the charcoal filter system.

Computer/Cable Spreading Room Ventilation System (CCSRVS)

This system comprises of two independent chilled water air conditioning (A/C) trains. Each train consists of a 100 percent capacity chilled package located on the control building roof and three air handling units. Two 50 percent capacity air handling units for each train are located in the computer room. One 100 percent capacity air handling unit for each train and a common duct run are located in the cable spreading room. Each train is capable of providing 100 percent cooling for both rooms during normal and emergency conditions.

The computer/cable spreading room HVAC system provides cooling and ventilation to equipment located in the Computer Room and CSR. The system is designed to maintain temperatures in the rooms below the 104 °F limit for the safety-related equipment.

During loss of offsite power (LOOP), the system is not automatically loaded on the EDG. The system is manually loaded on the EDG by administrative procedures. The temperature indicator in the control room provides indication to allow operators to load the system prior to exceeding the temperature limitations.

DC Equipment/Inverter Room Ventilation System (DCEIRVS)

The DC equipment/inverter room HVAC system provides cooling and ventilation in the control building annex. This system provides cooling to the equipment in the inverter rooms, the DC equipment rooms, and the battery rooms which comprise the annex. The HVAC system for these rooms consists of a common split A/C unit and two packaged A/C units. One packaged unit is dedicated to the north or and the other to the south equipment room. The common unit can provide air to both the north and south rooms.

The system design also incorporates a supplemental cooling system consisting of portable fans and administrative controls. This supplemental cooling system will be used to enhance ventilation in the room and also to draw cooler air from adjacent rooms to maintain temperatures in a range compatible with equipment operation. When not in use, the dedicated fans are stored in seismically designed restraints in close proximity to the equipment rooms.

All of the ventilation and air conditioning equipment is capable of being powered from an EDG. The common split A/C unit is automatically loaded on the EDGs following a loss of offsite power. The north and south units are powered from vital buses and may be manually started

after a loss of offsite power. Special dedicated receptacles have been provided in the rooms to power the portable fans. These fixtures are 120 VAC fed from an EDG-backed source.

This system circulates air from these rooms to air conditioning units or the air handling unit and returns cool air into the rooms. Each unit is controlled by a thermostat. These units are designed to maintain the temperature in the room below 104 °F.

In the event of a fire or failure of one of the HVAC units, the room temperature may increase. Routine surveillance of these rooms is performed to confirm that a suitable environment for the equipment is maintained. If increasing temperatures is noted, supplemental cooling can be initiated using the portable fans. The batteries have been shown to be operable at temperatures up to 110 °F and other safety-related equipment is operable at temperatures up to 135 °F (for short time periods). The supplemental cooling system, is capable of maintaining temperatures below these limits.

CBVS components subject to an AMR include air handling unit housing and valves (pressure boundary only), heat exchangers, ductwork, piping, tubing, and fittings. The intended functions of CBVS components subject to an AMR include maintaining pressure boundary integrity. CBVS components that require an AMR and their intended functions are listed in Table 3.4-11 of the LRA. The AMR for CBVS is discussed in Section 3.4 of the LRA.

In LRA Section 2.3.3.11 and Section 9.9.1 of the UFSAR, the applicant identified the following functions for the CBVS, consistent with 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2).

Section 2.3.3.11 of the LRA -

CRVS

- Provides a temperature-controlled environment to ensure proper operation of equipment in the control building.
- Circulates air from the control room and offices through roughing filters to the air handling units.
- Maintains the habitability of the control room following design basis events.

CCSRVS

- Maintains the temperature and humidity requirements of the vital electrical equipment installed in the computer and cable spreading rooms.
- Provides sufficient ventilation for intermittent occupancy by operations and maintenance personnel in the computer and cable spreading rooms.

DCEIRVS

- Provides cooling to the rooms that house the safety-related battery banks, battery charges, inverter, and DC load centers in the DC equipment/inverter rooms.

Section 9.9.1 of the UFSAR -

CRVS

- Provides pressurization using a limited quantity of outside air drawn through a charcoal filter system.

- Maintains a positive pressure in the control room over the cable spreading room in order to prevent smoke from a hypothesized fire in the cable spreading room from entering the control room.

CCSRVS

- Removes heat dissipated by all equipment in the computer and cable spreading rooms during normal plant operation and emergency condition.

- Provides a redundant, reliable, and independent system supplied from emergency power to maintain a temperature-controlled environment for the safety-related equipment located within the computer and cable spreading rooms.

DCEIRVS

- Provides a redundant, reliable, independent means of maintaining the room temperatures below the qualified operability temperature of the equipment located within the DC equipment/inverter room.

- Maintains the battery rooms at a temperature above that at which the battery capacity must be derated below its required capacity.

- Maintains adequate ventilation to ensure that hydrogen concentration remains below the lower limit of flammability.

- Maintains room temperature during normal plant operation below the continuous operation qualification temperature of the equipment in the room.

On the basis of the intended functions identified above for the CBVS, the applicant determined that all CBVS safety-related components (electrical, mechanical, and instrument) are within the scope of license renewal. The applicant described its process for identifying the mechanical components that are subject to an AMR in Section 3.4, "Auxiliary Systems," of the LRA. The applicant uses this methodology, to identify the portions of the CBVS that are within the scope of license renewal and that are highlighted on flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical components and component types that are within the scope of license renewal and subject to an AMR. The applicant provided this list in Table 3.4-11 of the LRA.

Specifically, the applicant identified the following component/commodity groups as being within the scope of license renewal and subject to an AMR:

- Internal environment: cable spreading room and computer room chilled water surge tanks (carbon steel), cable spreading room and computer room chilled water pumps (carbon steel), cable spreading room and computer room chilled water boxes (carbon steel), wye strainer thermowells (carbon steel), valve piping/fitting level gauges (carbon steel), flow elements (carbon steel), flow elements (stainless steel), air separator valves tubing/fittings (stainless steel), control room ventilation air handling unit housings (carbon steel, galvanized), control room ventilation recirculation filter housing (carbon steel, galvanized), inverter room and battery room air handling unit housing (carbon steel, galvanized), cable spreading room and computer room air handling unit housings (stainless steel), cable spreading room and computer room air handling unit headers (stainless steel), cable spreading room and computer room air handling unit tubes (copper), cable spreading room and computer room air handling unit air boxes in air handlers (carbon steel), ductwork (carbon steel, galvanized), and ductwork flexible connectors (coated canvas)

- External environment: cable spreading room and computer room chilled water surge tanks (carbon steel), cable spreading room and computer room chilled water pumps (carbon steel), cable spreading room and computer room chilled water boxes (carbon steel), wye strainers (carbon steel), valves, piping/fittings, level gauges and thermowells (carbon steel), valve piping/fitting, and thermowells (carbon steel), flow elements (carbon steel), valves and tubing/fittings (stainless steel), air separators, valve, tubing/fittings (stainless steel), flow elements (stainless steel), control room ventilation air handling unit housings (carbon steel, galvanized), control room ventilation recirculation filter housing (carbon steel, galvanized), inverter room and battery room air handling unit housing (carbon steel, galvanized), cable spreading room and computer room air handling unit housings (stainless steel), cable spreading room and computer room air handling unit headers (stainless steel), cable spreading room and computer room air handling unit tubes (copper), cable spreading room and computer room air handling unit air boxes in air handlers (carbon steel), cable spreading room and computer room air handling unit tube fins (aluminum) and ductwork (carbon steel, galvanized), ductwork flexible connectors (coated canvas), and bolting (carbon steel).

In LRA Table 3.4-11, the applicant also notes that maintaining pressure boundary and transferring are the only applicable intended functions associated with the components of the CBVS that are subject to an AMR.

2.3.3.11.2 Staff Evaluation

The NRC staff reviewed the above information to verify that the applicant identified the components of the CBVS that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff also reviewed the information in UFSAR Section 9.9. After completing the initial review, the staff issued an RAI by letter dated December 22, 2000, regarding the CBVS. The applicant responded to the RAI by letter dated January 19, 2001.

In LRA Section 2.1, "Scoping and Screening Methodology," the applicant discusses the process to identify mechanical components that are subject to an AMR. The NRC staff evaluated the applicant's methodology in Section 2.1 of this SER, "Scoping and Screening Methodology."

In its review of the CBVS, the NRC staff reviewed the drawings listed in LRA Table 2.3-5, which show the evaluation boundaries for the highlighted portion of the CBVS that are within the scope of license renewal. The staff also reviewed Table 3.4-11 which listed the mechanical components and applicable intended functions that are subject to an AMR.

The NRC staff also reviewed UFSAR Section 9.9, to determine if there were any portions of the CBVS that met the scoping criteria in 10 CFR 54.4(a) and that are not identified as being within the scope of license renewal. The staff also reviewed the Turkey Point UFSAR to determine if there are any safety-related system functions that are not identified as intended function(s) in the LRA, and to determine if there are any SCs that have intended function(s) that might have been omitted from the scope of SCs that are subject to an AMR. The staff also reviewed the system flow diagrams identified in Table 2.3-5 of the LRA to determine if any SCs within the evaluation boundaries were omitted from the scope of components that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). The NRC staff compared the functions described in the UFSAR to those identified in the LRA. The NRC staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those identified as being within the scope of license renewal.

The applicant identified the SCs subject to an AMR for the CBVS, using the screening methodology described in Section 2.1 of the LRA, and listed them in Table 3.4-11 of the LRA. The NRC staff evaluated the scoping and screening methodology, and documented its findings in Section 2.1 of this SER. The NRC staff sampled the SCs listed in Table 3.4-11 of the LRA to verify that the applicant accurately identified the SCs that are subject to an AMR. The staff also sampled the SCs that the applicant identified as within the scope of license renewal but not subject to an AMR, to verify that the SCs perform their intended functions with moving parts or with a change in configuration or properties, and are subject to replacement on the basis of a qualified life or specified time period.

To help ensure that those portions of the CBVS that the applicant identified as not being within the scope of license renewal not perform any of the scoping functions in 10 CFR 54.4, the NRC staff requested additional information on the basis of the information in the UFSAR and LRA. The NRC staff noted that LRA Section 2.3.3.11 presents a summary description of the system functions, the Table 2.3-5 flow diagrams highlight the evaluation boundaries of the CBVS, and Table 3.4-11 tabulates the CBVS components that are within the scope of license renewal and subject to an AMR. The corresponding drawings for these systems in the UFSAR, however, show additional components that were not listed in Table 3.4-11 of the LRA.

The NRC staff requested specific information concerning the exclusion of the following components from the scope of license renewal and/or from an AMR:

- housings for dampers, diffusers, fans, exhausts hoods, and louvers
- sealant materials used to maintain the main control room envelope (MCRE) at positive pressure with respect to adjacent areas in order to prevent unfiltered inleakages into the MCRE

- areas that constitute the MCRE and verification of all CRVS components which are relied on to perform the safety-related cooling and filtrations that are identified to be within the scope of license renewal and subject to an AMR
- exhaust damper D-19 associated with housing and ductwork
- exhaust fan housings and associated ductwork for the battery rooms

In a letter dated January 19, 2001, the applicant provided a response to RAI 2.3.3.11-1. The applicant stated that control building ventilation fans and dampers, including their housings, were evaluated and determined that several of these components, e.g., the control room supply fans and their associated dampers, support system intended functions that satisfy the scoping criteria of 10 CFR 54.4 and are within the scope of license renewal. However, fans and dampers were determined to be active components and not subject to an AMR consistent with 10 CFR 54.21(a)(1)(i) and the guidance of Appendix B to NEI 95-10, Revision 2.

The staff requested clarification or justification in RAI 2.3.3.11-1 concerning the exclusion of the CBVS housings for dampers, diffusers, fans, and louvers from the scope of license renewal or an AMR in accordance with the requirements of 10 CFR 54.4(a)(1), 10 CFR 54.4(a)(2), 10 CFR 54.4(a)(3), and 10 CFR 54.21(a)(1)(i).

In a letter dated July 18, 2001, the applicant provided additional clarifying information stating that the housings for dampers and fans have been included in the AMR for the CBVS as part of Table 3.4-11 of the LRA. CBVS diffusers were evaluated and determined not to be within the scope of license renewal since they are not safety related and do not support any intended functions that satisfy the scoping criteria in 10 CFR 54.4. The control building ventilation does not include any exhaust hoods or louvers.

On the basis of the additional information provided by the applicant, the NRC staff determined that it is acceptable to exclude the housings, fan louver, and diffusers from the scope of license renewal because they do not meet the scoping criteria in 10 CFR 54.4.

In addition, the applicant provided a response to RAI 2.3.3.11-3 regarding the exclusion of self-contained packaged units from license renewal and from an AMR. The applicant stated that the condensing units are self-contained packaged units and that the entire unit is replaced when necessary. Therefore, these units are considered to be active components and as such are not subject to an AMR.

On the basis of the information in the regulation, the statement of consideration (SOC) accompanying 10 CFR Part 54, and guidance provided in the SRP, the staff concludes that the housings of the self-contained packaged units contribute to the performance of the intended function of the self-contained packaged units without moving parts and without change in configuration or properties, and thus are within the scope of license renewal and subject to an AMR.

The staff requested clarification or justification in RAI 2.3.3.11-3 concerning the exclusion of the CBVS housings for the self-contained packaged units from the scope of license renewal or an

AMR in accordance with the requirements of 10 CFR 54.4(a)(1), 10 CFR 54.4(a)(2), 10 CFR 54.4(a)(3), and 10 CFR 54.21(a)(1)(i).

In a letter dated January 19, 2001, the applicant provided a response to RAI 2.3.3.11-3 regarding the exclusion of filter elements from license renewal and an AMR. The applicant stated that filter elements do not require an AMR because they are replaced based on performance testing, and therefore are not considered to be long-lived in accordance with NEI 95-10, Revision 2, and in accordance with the NRC resolution of License Renewal Issue No. 98-12, "Consumables" (NRC Letter from C. I. Grimes to D. J. Walters (NEI), dated March 10, 2000).

The guidance in the March 10, 2000, letter on consumables required the applicant to identify any SCs that are excluded under 10 CFR 54.21(a)(1)(ii) based on performance or condition monitoring, and to provide a site-specific evaluation to justify the exclusion of any structure or component based on performance or condition monitoring. Based on this guidance, the staff has determined that the applicant needs to provide bases, in accordance with the requirements of 10 CFR 54.4(a)(1),10 CFR 54.4(a)(2), 10 CFR 54.4(a)(3), and 10 CFR 54.21(a)(1)(i), that justify the exclusion of these SCs from the scope of license renewal and from an AMR or include them in LRA Table 3.4-11. The staff requested clarification or justification in RAI 2.3.3.11-3 concerning the evaluation to justify the exclusion of CBVS filter elements from the scope of license renewal and subject to an AMR.

The applicant clarified that the Turkey Point Nuclear Plant Units 3 and 4, technical specification 3.4.7.5 "Control Building Emergency Ventilation System" Surveillance Requirements b, c, and d provides the performance testing requirements for the CBVS filtration unit filters.

The NRC staff reviewed technical specification 3.4.7.5, and found that surveillance requirements b, c, and d are within the NRC regulatory requirements and guidelines:

"Sealant materials are used to maintain the main control room at positive pressure with respect to adjacent areas. These sealant materials are included within the scope of license renewal as structural components and subject to an aging management review. These sealant materials are described in Subsection 3.6.2.4 and listed in Tables 3.6-5 and 3.6-12 of the LRA."

The MCRE consists of the control room, including the control room offices, rack area, kitchen, and lavatory, and the mechanical equipment room, as shown on drawing 0-CBVAC-01. Both rooms are considered part of the envelope because both are serviced and pressurized by the control room ventilation air handlers through common ductwork. The boundaries of the envelope are the floors, walls, ceilings, dampers, doors, penetration seals, and ductwork of the two rooms.

The NRC staff reviewed the applicant's response for sealant materials and MCRE components and found the response to be acceptable and consistent with the applicable requirements of 10 CFR 54.21 and 10 CFR 54.4. Also, the NRC staff reviewed the LRA, supporting information in the UFSAR, and the applicant's responses to the staff's RAI. In addition, the NRC staff sampled several components from the CRVS flow diagram (Table 2.3-5 of the LRA) to determine whether the applicant properly identified the components that are within the scope of license renewal and subject to an AMR. No omissions were identified.

In a letter dated January 19, 2001, the applicant clarified that:

"Drawings 0-CBVAC-02 and 0-CBVAC-03 are for the computer and cable spreading room HVAC and the DC equipment/inverter rooms HVAC, respectively, and do not show equipment required for control room habitability."

Exhaust damper D-19 is not required to maintain the MCRE. Automatic isolation of upstream damper D-14 provides for maintaining the MCRE, and hence the license renewal boundary is established at D-14.

As described in Section 9.9.2 of the Turkey Point UFSAR for Units 3 and 4, the DC equipment/inverter room HVAC provides cooling to the equipment in the inverter rooms, the DC equipment rooms and the battery rooms. The battery rooms roof ventilators supplement the DC equipment/inverter room HVAC to improve the ambient conditions in the battery rooms, but are not relied upon to maintain the temperatures in a range compatible with equipment operation. Therefore, the battery roof ventilators are not required to support license renewal system intended function and are not within the scope of license renewal.

The applicant also clarified in the letter dated January 19, 2001, that the diffusers installed at the supply duct outlets associated with the CBVS do not support any license renewal system intended function, therefore do not require an AMR.

The NRC staff agrees with the applicant's clarification of the above RAI response.

Some components that are common to many systems, including the CBVS, have been evaluated in the LRA is separate commodity groups with similar components from other systems, and are evaluated by the NRC staff in other sections throughout this SER.

In Section 2.4 of the SER the staff evaluated component supports for piping, cables, and equipment, which are discussed in LRA Section 2.4, "Scoping and Screening Results - Structures." In Section 2.5 of the SER, the staff evaluated the electrical components that support the operation of the CBVS; these components are discussed in LRA Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls (I&C)." The CBVS instrumentation lines are listed as "tubing" in Table 3.4-11 of the LRA.

The NRC staff reviewed the LRA, supporting information in the UFSAR, and the applicant's responses to the staff's RAI. In addition, the NRC staff sampled several components from the CBVS flow diagrams (Table 2.3-5 of the LRA) to determine whether the applicant properly identified the components that are within the scope of license renewal and subject to an AMR. No omissions were identified.

2.3.3.11.3 Conclusion

On the basis of this review, the staff has reasonable assurance that the applicant has adequately identified the CBVS components that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 54.21, respectively.

2.3.3.12 Emergency Diesel Generator Building Ventilation

In LRA Section 2.3.3.12, "Emergency Diesel Generator Building Ventilation," the applicant identified portions of the EDG building ventilation system (EDGBVS) and the components that are within the scope of license renewal and subject to an AMR. The applicant stated in Section 2.3.3.12 of the LRA that additional information for the EDGBVS is provided in Section 8.2.2.1.1.3 of the UFSAR. The system scoping is shown in EDGBVS evaluation boundary flow drawings 0-ABVAC-01, Rev. 0, and 0-ABVAC-02, Rev. 0, for Units 3 and 4 and are listed in Table 2.3-5 of the LRA.

The applicant evaluated component supports for HVAC systems, roof hoods (Unit 4), and louvers that are associated with the EDGBVS in Section 3.6.2 and Table 3.6-10 of the LRA. The applicant also evaluated electrical components that support the operation of the EDGBVS in Section 2.5 of the LRA.

The staff evaluated component supports in the section on the EDG building structures and electrical components in Section 2.5 of this SER. The instrument lines are individually highlighted as being within the scope of license renewal on flow diagram 4-EDVAC-01, Rev. 0. The applicant evaluated instrument line components with the EDGBVS in Section 2.3.3.12 of the LRA.

2.3.3.12.1 Technical Information in the Application

The original emergency onsite AC power for Turkey Point Units 3 and 4 consisted of two EDGs. The two original EDGs are presently identified as 3A and 3B, and are housed in the Unit 3 EDG building (EDGB). In 1990 and 1991, two additional EDG units, 4A and 4B, were added to the emergency power system. The Unit 4 EDGB was designed and constructed to house the additional units.

Both the Unit 3 and Unit 4 EDGBs are reinforced concrete structures housing safety-related SSCs. The first floor of each building is divided into two bays, each bay containing one of the two engine-generator sets housed in the building. The EDGBs also house components of the EDG subsystems, such as the fuel oil, starting air, lubricating oil, combustion air, and exhaust air equipment.

The EDGBVS is required to provide cooling functions for the EDGs and associated equipment. The EDGBVS is different for Turkey Point Units 3 and 4. The EDGBVS is necessary to ensure proper operation of the EDGs and other safety-related electrical equipment.

The Unit 3 EDGBVS consists of one wall-mounted exhaust fan and associated ductwork for each EDG. The fan operates to maintain cooling in the room when its associated EDG is running.

The Unit 4 EDGBVS includes the following subsystems: EDG ventilation, diesel room ventilation, and 3D and 4D switchgear room ventilation. The Unit 4 EDGBVS is described in UFSAR Section 8.2.2.1.1.3.

The flow diagram listed in Table 2.3-5 shows the evaluation boundaries for the portions of EDGBVS that are within the scope of license renewal. Note: There is no flow diagram for the Unit 3 EDGBVS; however, all components associated with this system are in the scope of license renewal.

The ventilation system associated with the EDG control panel rooms and the 3D/4D 4.16 kV switchgear rooms is designated safety-related and meets Seismic Category I requirements.

The design of these systems meets the following performance requirements:

- Each EDG control panel room is equipped with a dedicated ventilation system with the ability to be powered by its associated EDG, and a single active failure resulting in loss of one ventilation system will not affect the performance capability of more than one EDG. For each 4.16 kV switchgear room, a dedicated ventilation system consisting of 100 percent redundant fans (i.e., one fan connected to a train power source), is provided. Therefore, a single active failure will not result in the loss of both fans to either switchgear room.

- Failure of non-Seismic Category I equipment or components will not result in damage to essential portions of the ventilation system.

- The ventilation system is designed to maintain a suitable ambient temperature range in the areas serviced.

- The ability of the safety-related equipment to function under the worst anticipated degraded ventilation system performance is assured.

- The capability of the system to automatically actuate components not operating during normal conditions, or actuate standby components (redundant equipment) in the event of a failure or malfunction, as needed, is provided.

- The capability of the system to control airborne particulate material (dust) accumulation is provided.

- The functional capability of the ventilation system will not be adversely affected during periods of abnormally high water levels (i.e., maximum probable flood).

- The ventilation system components have sufficient physical separation or shielding to protect the system from internally or externally generated missiles.

- The system components are protected from the effects of pipe cracks and breaks in piping since there are no high- or moderate-energy lines in the Unit 4 EDGB.

EDGBVS components subject to an AMR include filters (pressure boundary only), ductwork, tubing, and fittings. The intended function for EDGBVS components subject to an AMR is to maintain pressure boundary integrity. The AMR for EDGBVS is discussed in Section 3.4 of the LRA and component intended functions are listed in Table 3.4-12 of the LRA.

In LRA Section 2.3.3.12 and Section 8.2.2.1.1.3 of the UFSAR, the applicant identified the following intended functions for the EDGBVS, consistent with 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2).

Section 2.3.3.12 of the LRA -

- Provide cooling functions for the EDGs and associated equipment.
- Ensure proper operation of EDGs and other safety-related equipment.

Section 8.2.2.1.1.3 of the UFSAR -

- Maintain a suitable ambient temperature range in the areas serviced.
- Control airborne particulate material.

On the basis of the functions identified above for the EDGBVS, the applicant determined that all EDGBVS safety-related components (electrical, mechanical, and instrument) are within the scope of license renewal. The applicant described its methodology for identifying the mechanical components that are subject to an AMR in Section 3.4, "Auxiliary Systems," of the LRA. The applicant used this methodology to identify the portions of the EDGBVS that are within the scope of license renewal, and that are highlighted on flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical component and component types that are within the scope of license renewal and subject to an AMR. The applicant provided this list in Table 3.4-12 of the LRA.

Specifically, the applicant identified the following device types for internal and external environments as being within the scope of license renewal and subject of an AMR:

- Internal environment: ductwork (carbon steel galvanized) and filter housings (carbon steel galvanized).

- External Environment: ductwork (carbon steel galvanized), filter housings (carbon steel galvanized), and bolting (carbon steel).

In LRA Table 3.4-12, the applicant also notes that maintaining pressure boundary integrity and transferring heat are the only applicable intended functions associated with the components of the EDGBVS that are subject to an AMR.

2.3.3.12.2 Staff Evaluation

The NRC staff reviewed the above information to verify that the applicant identified the components of the EDGBVS that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21 (a)(1). The staff also reviewed the information in UFSAR Section 8.2.2.1.1.3. After completing the initial review, the NRC staff issued an RAI by letter dated December 22, 2000, regarding the EDGBVS. The applicant responded to the RAI by letter dated January 19, 2001.

In LRA, Section 2.1, "Scoping and Screening Methodology," the applicant discussed the process for identifying mechanical components that are subject to an AMR. The NRC staff evaluated the applicant's methodology in Section 2.1 of this SER, "Scoping and Screening Methodology."

In its review of the EDGBVS, the NRC staff reviewed the drawings listed in LRA Table 2.3-5

which show the evaluation boundaries for the highlighted portions of the EDGBVS that are within the scope of license renewal, and Table 3.4-12, which listed the mechanical components and applicable intended functions that are subject to an AMR.

The NRC staff also reviewed UFSAR, Section 8.2.2.1.1.3 to determine if there were any portions of the EDGBVS that met the scoping criteria in 10 CFR 54.4(a) but were not identified as being within the scope of license renewal. The staff also reviewed the UFSAR to determine if there were any safety-related system functions that were not identified as intended function(s) in the LRA and to determine if there were any SCs that have intended function(s) that might have been omitted from the scope of SCs that are subject to an AMR. The staff also reviewed the system flow diagrams identified in Table 2.3-5 of the LRA to determine if any SCs within the evaluation boundaries were omitted from the scope of components that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). The NRC staff compared the functions described in the UFSAR to those identified in the LRA. The NRC staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those identified as being within the scope of license renewal.

The applicant identified the SCs subject to an AMR for the EDGBVS using the screening methodology described in Section 2.1of the LRA, and listed them in Table 3.4-12 of the LRA. The NRC staff evaluated the scoping and screening methodology, and documented its findings in Section 2.1 of this SER. The NRC staff sampled the SCs listed in Table 3.4-12 of the LRA to verify that the applicant accurately identified the SCs that are subject to an AMR. The staff also sampled the SCs that the applicant identified as be within the scope of license renewal, but not subject to an AMR, to verify that the SCs perform their intended functions with moving parts or with a change in configuration or properties, and are subject to replacement on the basis of a qualified life or specified time period.

To help ensure that those portions of the EDGBVS that the applicant identified as not being within the scope of license renewal do not perform any of the scoping functions in 10 CFR 54.4, the NRC staff requested additional information on the basis of the information in the UFSAR and LRA. The NRC staff noted that LRA Section 2.3.3.12 presents a summary description of the system functions, the Table 2.3-5 flow diagrams highlight the evaluation boundaries of the CBVS, and Table 3.4-12 tabulates the EDGBVS components that are within the scope of license renewal and subject to an AMR. The corresponding drawings for these systems in the UFSAR, however, show additional components that were not listed in Table 3.4-12 of the LRA.

The NRC staff requested specific information concerning the exclusion of the following components from the scope of license renewal and/or from an AMR:

- The housings for the exhaust fans, associated dampers and ductwork, and hoods for diesel generator rooms 4A and 4B and oil transfer rooms 4A and 4B.

In a letter dated January 19, 2001, the applicant provided a response to RAI 2.3.3.12-1. The applicant stated that the license renewal boundary drawings depict mechanical pressure boundaries within the scope of license renewal. The ventilation fans and associated dampers and ductwork in the diesel generator rooms (4A and 4B) and diesel oil transfer rooms (4A and 4B) are classified non-safety-related and are not relied upon to perform or support any license renewal intended function. Adequate ventilation for the diesel oil transfer rooms is provided by natural circulation. Safety-related ventilation for the 4A and 4B diesel generator rooms is provided by the

diesel generator radiator fans, which are evaluated as part of the EDGs and support systems described in Subsection 2.3.3.15 (page 2.3-35) of the LRA.

The NRC staff agrees with the applicant's clarification of the EDGBVS housings for fans and housing for dampers that these components are classified as non-safety-related and are not relied upon to perform and license renewal intended functions .

The staff also requested clarification or justification in RAI 2.3.3.12.1 concerning the exclusion of the EDGBVS housings for exhaust hoods from the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a)(1), 10 CFR 54.4(a)(2), 10 CFR 54.4(a)(3), and 10 CFR 54.21(a)(1)(i).

In a letter dated July 18, 2001, the applicant provided additional clarifying information stating that the exhaust hoods in diesel generator rooms (4A and 4B) and diesel oil transfer room (4A and 4B) are classified non-safety-related and are not relied upon to perform or support any license renewal systems intended functions. The NRC staff agrees with the applicant's clarification for the EDGBVS housings for exhaust hoods.

In Section 2.4 of this SER, the staff evaluated component supports for piping, cables, and equipment, which are discussed in LRA Section 2.4, "Scoping and Screening Results - Structures." In Section 2.5 of this SER, the staff evaluated the electrical components that support the operation of the EDGBVS; these components are discussed in LRA Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls (I&C)." The EDGBVS instrumentation lines are listed as "tubing" in Table 3.4-12 of the LRA.

The NRC staff reviewed the LRA, supporting information in the UFSAR, and the applicant's responses to the staff's RAI. In addition, the NRC staff sampled several components from the EDGBVS flow diagrams (Table 2.3-5 of the LRA) to determine whether the applicant properly identified the components that are within the scope of license renewal and subject to an AMR. No omissions were identified.

2.3.3.12.3 Conclusion

On the basis of this review, the staff has reasonable assurance that the applicant has adequately identified the EDGBVS components that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 54.21, respectively.

2.3.3.13 Turbine Building Ventilation System

In LRA Section 2.3.3.13, "Turbine Building Ventilation," the applicant identified portions of the turbine building ventilation system (TBVS) and the components that are within the scope of license renewal and subject to an AMR. The applicant stated in Section 2.3.3.13 of the LRA that additional information for the TBVS is provided in Section 9.16 of the UFSAR. The system scoping is shown in TBVS evaluation boundary flow drawings 3-TBVAC-01, Rev. 0, 3-TBVAC-02, Rev. 0, 4-TBVAC-01, Rev. 0, and 4-TBVAC-02, Rev. 0, for Units 3 and 4, respectively. The components are listed in Table 2.3-5 of the LRA.

The applicant evaluated component supports for HVAC systems that are associated with the TBVS in Section 3.6.2 and Table 3.6-17 of the LRA. The applicant evaluated electrical

components that support the operation of the TBVS in Section 2.5 of the LRA. The staff evaluated component supports in section on the turbine building structures and electrical components in Section 2.5 of this SER. The instrument lines are individually highlighted as being within the scope of license renewal on flow diagrams 3-TBVAC-01, Rev. 0, 3-TBVAC-02, Rev. 0, 4-TBVAC-01, Rev. 0, and 4-TBVAC-02, Rev. 0. The applicant evaluated instrument line components within the TBVS in Section 2.3.3.13 of the LRA.

2.3.3.13.1 Technical Information in the Application

The turbine building is a reinforced concrete and steel structure. It is primarily an open steel frame built on a reinforced concrete mat foundation. The reinforced concrete turbine pedestals are the dominant structural features of the turbine building. The building is essentially rectangular in shape with the long north-south axis sharing the Unit 3 and 4 turbine centerline orientation. The ground floor of the turbine building is surrounded by a flood wall to protect turbine building equipment.

The TBVS provides a temperature-controlled environment to ensure proper operation of equipment in the turbine building. TBVS consists of two subsystems: the steam generator feed pump ventilation system (SGFPVS) and the load center and switchgear rooms ventilation system (LCSGRVS). The SGFPVS and LCSGRVS are described in UFSAR Sections 9.11 and 9.16, respectively.

The SGFPVS provides cooling to the steam generator feed pump. The subsystem is non-safety-related, performs no safety-related functions, and is not within the scope of license renewal.

The LCSGRVS provides a temperature-controlled environment for the safety-related 4160V switchgear and 480V load centers in the rooms during normal and emergency conditions.

The LCSGRVS is designed to accomplish the following:

- Remove the heat dissipated by equipment in the load center and switchgear rooms during normal plant operation and emergency conditions, maintaining room temperatures below 95 °F. However, the design limit for the equipment in the load center room is 104 °F, while the design limit for the equipment in the switchgear room is 100 °F. It should be noted that single-train operation during emergency operations (i.e., one chiller unit loop/safety injection) may require operator action to prevent exceeding the design temperatures of the equipment in load center and switchgear rooms for more than 7 days.

- Provide a redundant, reliable, and independent system supplied from emergency power to maintain a temperature-controlled environment for the safety-related equipment located within the load center and switchgear rooms.

The air conditioning system itself does not perform a safety-related function.

TBVS components subject to an AMR include pumps, valves, and air handling units (pressure boundary only); and heat exchangers, piping, tubing, and fittings. The intended functions for TBVS components subject to an AMR include pressure boundary integrity, throttling,

and heat transfer. Table 3.4-13 includes the TBVS components that require an AMR. The AMR for the TBVS is discussed in Section 3.4 of the LRA.

In LRA Section 2.3.3.13, and Section 9.16 of the UFSAR, the applicant identified the following intended functions for the TBVS, consistent with 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2).

Section 2.3.3.13 of the LRA -

- Provide a temperatures controlled environment to ensure proper operation of equipment in the turbine building.

- Provide a temperature-controlled environment for the safety-related 4160V switchgear and 480V load center located in the switchgear and load center rooms.

Section 9.16 of the UFSAR -

- Remove the heat dissipated by all equipment in the load center and switchgear room during normal plant operation and emergency conditions, maintaining room temperatures below 95 °F with an outdoor air temperature of 95 °F.

- Provide a redundant, reliable, and independent system supplied from emergency power to maintain a temperature-controlled environment for the safety-related equipment located within the load center and switchgear rooms.

On the basis of the functions identified above for the TBVS, the applicant determined that all TBVS safety-related components (electrical, mechanical, and instrument) are within the scope of license renewal. The applicant described its process for identifying the mechanical components that are subject to an AMR in Section 3.4, "Auxiliary Systems," of the LRA. The applicant uses this methodology to identify the portions of the TBVS that are within the scope of license renewal and that are highlighted on flow diagrams listed in Table 2.3-5 of the LRA. Using the methodology described in Section 2.2.1 of the LRA, the applicant compiled a list of the mechanical components and components types that are within the scope of license renewal and subject to an AMR. The applicant provided this list in Table 3.4-13 of the LRA.

Specifically, the applicant identified the following device types for internal and external environments as being within the scope of license renewal and subject of an AMR:

- Internal environment: chilled water surge tanks (carbon steel), chilled water air separators (carbon steel), chilled water pumps (carbon steel), chilled water boxes (carbon steel), valve piping/fittings (carbon steel), valve tubing/fitting level gauges (stainless steel), flexible hoses (stainless steel), wye strainers, thermowells, test wells (carbon steel), flow elements (stainless steel and carbon steel) air handling unit housings (carbon steel), air handling unit headers (carbon steel), air handling unit heat exchanger tubes (copper), air handling unit air boxes in air handlers (carbon steel).

- External environment: chilled water surge tanks (carbon steel), chilled water air separators (carbon steel), chilled water pumps (carbon steel), chilled water boxes (carbon steel), valve piping/fittings, wye strainers, thermowells, test wells (carbon steel), valves, tubing/fittings, test wells (carbon steel), valves, tubing/fittings, flexible

hoses, level gauges (stainless steel), valves, tubing/fittings, flexible hoses (stainless steel), flow elements (carbon steel), air handling unit housings (carbon steel, galvanized and stainless steel), air handling unit headers (carbon steel), air handling unit heat exchanger tubes (copper), air handling unit air boxes (carbon steel), air handling unit heat exchanger fins (aluminum), and bolting (mechanical closures) (carbon steel).

2.3.3.13.2 Staff Evaluation

The NRC staff reviewed the above information to verify that the applicant identified the components of the TBVS that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1). The staff also reviewed the information in UFSAR Sections 9.11 and 9.16.

In LRA Section 2.1 the applicant discussed the process for identifying mechanical components that are subject to an AMR. The NRC staff evaluated the applicant's methodology in Section 2.1 of this SER, "Scoping and Screening Methodology."

In its review of the TBVS, the NRC staff reviewed the drawings listed in the LRA Table 2.3-5, which shows the evaluation boundaries for the highlighted portion of the TBVS that are within the scope of license renewal, and Table 3.4-13, which lists the mechanical components and applicable intended functions that are subject to an AMR.

In Section 2.4 of this SER the staff evaluated component supports for piping, cables, and equipment, which are discussed in LRA Section 2.4, "Scoping and Screening Results - Structures." In Section 2.5 of this SER, the staff evaluated the electrical components that support the operation of the TBVS; these components are discussed in LRA Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls (I&C)." The TBVS instrumentation lines are listed as "tubing" in Table 3.4-13 of the LRA.

The NRC staff also reviewed UFSAR Section 9.9 to determine if there were any portions of the TBVS that met the scoping criteria in 10 CFR 54.4(a) but were not identified as being within the scope of license renewal. The staff also reviewed the UFSAR to determine if there were any safety-related system functions that were not identified as intended function(s) in the LRA, and to determine if there were any SCs that have intended function(s) that might have been omitted from the scope of SCs that are subject to an AMR. The staff also reviewed the system flow diagrams identified in Table 2.3-5 of the LRA to determine if any SCs within the evaluation boundaries were omitted from the scope of components that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). The NRC staff compared the functions described in the UFSAR to those identified in the LRA. The NRC staff then determined whether the applicant had properly identified the SCs that are subject to an AMR from among those identified as being within the scope of license renewal.

The NRC staff reviewed the LRA and supporting information in the UFSAR. In addition, the NRC staff sampled several components from the TBVS flow diagrams (Table 2.3-5 of the LRA) to determine whether the applicant properly identified the components that are within the scope of license renewal and subject to an AMR. No omissions were identified.

2.3.3.13.3 Conclusion

On the basis of this review, the staff has reasonable assurance that the applicant has adequately identified the TBVS components that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 54.21, respectively.

2.3.3.14 Fire Protection System

In LRA Table 2.2-1, "License Renewal Scoping Results for Mechanical Systems," the applicant identified fire protection (FP) as a system within the scope of license renewal in accordance with 10 CFR 54.4(a)(3) and subject to an AMR. In the LRA, Section 2.3.3.14, "Fire Protection," the applicant identifies and describes the systems and components that are within the scope of license renewal and subject to an AMR in the LRA. Table 3.4-14, "Fire Protection," of the LRA lists the FP components and provides aging management review information. The applicant describes its process for identifying the mechanical components that are within the scope of license renewal and subject to an AMR in the LRA, Section 2.1.1.4.1, "Other Scoping Pursuant to 10 CFR 54.4(a)(3), Fire Protection (FP)."

By letter dated January 24, 2001, the staff issued a RAI regarding the FP systems and components. By letter dated February 26, 2001, the applicant responded to that RAI.

2.3.3.14.1 Summary of Technical Information in the Application

In accordance with 10 CFR 54.4(a)(3), the SSCs that are relied on in safety analysis or plant evaluations to demonstrate compliance with 10 CFR 50.48, the FP Rule, are within the scope of license renewal. The FP system is relied upon to meet the requirements of 10 CFR 50.48.

10 CFR 54.4(a)(3) requires that all SSC's relied upon in safety analyses or plant evaluation to demonstrate compliance with 10 CFR 50.48, be included within the scope of license renewal. 10 CFR 50.48 requires that the applicant implement and maintain a FP program. The applicant used the Turkey Point UFSAR, licensing correspondence and design basis documents to include the fire protection features and commitments, required for 10 CFR 50.48, in the scope of license renewal. This scoping methodology is discussed in Section 2.1.1.4.1 of the LRA.

In addition to the UFSAR, licensing correspondence and design basis documents, the two primary information sources reviewed by the applicant for scoping were the Turkey Point's Safe Shutdown Analysis and Essential Equipment List. The Safe Shutdown Analysis was reviewed to ensure that all the equipment required for safe shutdown, including power and control cables, and equipment that could adversely affect safe shutdown if spuriously actuated by fire-induced faults had been identified. The Essential Equipment List defines the minimum equipment necessary to bring the plant to cold shutdown and contains all power generation and distribution equipment (e.g., diesel generators, batteries, switchgear, motor control centers, power panels) that are required for the operation of the safe shutdown equipment. Also the Essential Equipment List includes equipment that could adversely affect safe shutdown if spuriously actuated by a fire-induced fault. The LRA notes that no equipment in storage is credited for safe shutdown.

The purpose of the FP system is to protect plant equipment in the event of a fire, help to ensure safe plant shutdown, and minimize the risk of a radioactive release to the environment. On the basis of the methodology described above, the applicant identifies the highlighted portions of the

flow diagrams, License Renewal Boundary Drawings: 0-FP-01 to 0-FP-10, 3-RCS-02 and 3-RCS-03, as the boundaries of the portions of the FP system that are included within the scope of license renewal.

In the LRA, Section 2.3.3.14, the applicant identifies the following FP system components that are within the scope of license renewal and subject to an AMR:

- fire water supply, including sprinklers,
- Halon suppression,
- fire dampers,
- Reactor Coolant Pump (RCP) oil collection,
- alternate shutdown,
- safe shutdown, and
- fire detection and protection.

The intended function of the FP mechanical components, identified by the applicant are, pressure boundary integrity, heat transfer, filtration, throttling, fire spread prevention and spray. In the LRA, Table 3.4-14, the applicant lists the mechanical components and their respective intended functions.

2.3.3.14.2 Staff Evaluation

The Commission's regulations in 10 CFR 54.21(a)(1), state that for those SSCs within the scope of this part, as delineated in 10 CFR 54.4, the applicant must identify and list those SCs subject to an AMR. The staff reviewed Section 2.3.3.14 of the LRA, as supplemented by additional information dated February 26, 2001, to determine whether there was reasonable assurance that the applicant has appropriately identified the components and supporting systems that serve FP-intended functions. This review also identified which components and supporting systems are within the scope of license renewal in accordance with 10 CFR 54.4, and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In the LRA, Section 2.3.3.14, the applicant describes the fire protection systems, and identifies the following criteria for including a component in the LRA:

- SCs that are safety related and are relied upon to remain functional during and following design-basis events,

- SCs that are non-safety related whose failure could prevent satisfactory accomplishment of the safety-related functions, and

- SCs that are relied on during postulated fires.

In the LRA, Table 2.3-5, "Auxiliary Systems Evaluation Boundaries," the applicant provides a list of scoping drawings, consisting of the flow diagrams for the fire protection systems that are within the scope of license renewal. The applicant submitted a highlighted set of these drawings with the LRA to show the portions of this system that are within the scope of license renewal. From the components highlighted in these drawings, the applicant submitted lists of the mechanical component groups that are subject to an AMR in the LRA, Table 3.4-14.

The components which constitute alternate shutdown and safe shutdown, in accordance with 10 CFR Part 50, Appendix R, were screened with their respective systems, and therefore are not addressed in this section of the SER.

The staff sampled portions of the applicant's UFSAR, Appendix 9.6A, "Fire Protection Program Report," which contains plant commitments and safety evaluations which form the basis of the FP program at Turkey Point. The staff then compared a sample of the FP systems and components identified within the UFSAR to the FP system flow diagrams to verify that required components were identified within the evaluation boundaries of the flow diagram and were not excluded from the scope of license renewal. The staff also compared SSCs identified in NRC approved SERs, which document the applicant's compliance to the provisions of Appendix A to Branch Technical Position (BTP) APCSB 9.5-1, "Fire Protection for Nuclear Power Plants" to the FP system flow diagrams to verify if portions of the FP system were inadvertently excluded from within the scope of license renewal.

In Appendix 9.6A of the UFSAR, the applicant states that it meets 10 CFR Part 50, Appendix A, General Design Criteria 3, "Fire Protection," using the guidelines contained in Appendix A to BTP 9.5-1. Since Turkey Point was licensed prior to 1979, Section III.G, III.J, and III.L of Appendix R also apply. The applicant primarily used the UFSAR as the primary information source during the scoping process for FP SSCs. The UFSAR contains the analysis to demonstrate compliance with Appendix R and with Appendix A to BTP 9.5-1.

The applicant's fire protection systems are primarily non-safety-related SSCs, which carry an augmented quality classification (Quality Related) and are included in the FPL Quality Assurance Program.

SSCs included within scope of license renewal are, fire water system including sprinklers, Halon fire suppression system, fire dampers, RCP oil collection, alternate shutdown, safe shutdown, and fire detection and protection. The following subset of the above components are subject to an aging management review: raw water tanks, pumps and valves (pressure boundary only), tanks, heat exchangers, hose stations, flame arrestors, sprinklers, strainers, orifices, piping, tubing and fittings. The complete list of fire protection components subject to an aging management review are included in the application Table 3.4-14.

The staff reviewed the above information to verify that the applicant identified the components of the fire protection systems that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 54.21(a)(1).

In a letter dated January 24, 2001, the staff requested additional information regarding the exclusion from the LRA of some FP components required to demonstrate compliance with 10 CFR 50.48.

The staff asked the applicant in letter dated January 24, 2001, to clarify why fire hydrants were not included in the fire protection portion of the LRA. In the letter dated, February 24, 2001, the applicant responded that for aging management review purposes, fire hydrants were categorized as valves, piping/fittings, and are included in the LRA, Table 3.4-14. Therefore, since the applicant treats fire hydrants as valves, piping/fittings, and subjects them to an AMR as appropriate, the staff finds this response acceptable.

The staff asked the applicant in letter dated January 24, 2001, to identify the applicable programs which will manage the aging of fire extinguishers, fire hoses, and air packs. The applicant responded in letter dated February 26, 2001, that the following standards are utilized as the basis and guidance for inspection and replacement of fire extinguishers, fire hoses, and air packs: NFPA 10, "Portable Fire Extinguishers," NFPA 14, "Standpipe and Hose Systems," and ANSI Z88.2, "Practices for Respiratory Protection." Additionally, the Nuclear Electric Insurance Limited (NEIL), Property Loss Prevention Standard, Appendix R of 10 CFR Part 50, and various NUREG reports and NRC Regulatory Guide are utilized for guidance. The staff found the applicant's response, i.e., replacing the above SSCs on the basis of condition, consistent with the staff's letter on consumables, and therefore, acceptable.

The staff asked the applicant to include fire dampers within the scope of license renewal and include components which are not active in the AMR. The applicant responded that the fire dampers were included in license renewal, but were considered active components and not subject to AMR. The fire damper housings (frame) and fusible link were reported by the applicant as being part of an active component. Therefore, since the applicant treats the entire fire damper including the housing and fusible links as active components, the staff finds this response acceptable.

Halon tanks and other related appurtenances were not included in the LRA. An RAI was sent January 24, 2001, and the applicant responded in a letter dated February 26, 2001, that portions of the Halon system had been inadvertently omitted and should be included in the LRA. The applicant stated that additional SSCs, specifically, Halon cylinders, flexible hoses, and Halon nozzles, have been added to Table 3.4-14. Other Halon suppression components were identified that require aging management reviews, they are, valves, pipes and fittings.

Two SSCs, transformer gravel pits and metal drip shields, were identified during a sampling review of the SER's dated May 5, 1999, and October 8, 1998, which were listed in the fire protection license condition as part of the fire protection program. These two SSCs were therefore part of the FP program for Turkey Point, but these SSCs are not included in the LRA. This concern was transmitted to the applicant in the RAI dated January 24, 2001, and the applicant responded that these SSCs were inadvertently omitted from the LRA tables. The staff was concerned that the scoping performed for the application was not complete, and this was investigated during the onsite inspection. Specifically, a question was asked during the scoping inspection performed May 21 to 25, 2001, regarding if there were additional fire protection plant modifications which were not included in the UFSAR and therefore not included in the LRA. The licensee developed a table of Plant Change Modification Packages, which shows that Plant Change Modification Packages which required UFSAR update had been included in the UFSAR and were included in the LRA. The few outliers that were identified were reportedly resolved by the RAIs. The applicant identified no other SSCs that were inadvertently omitted from the LRA.

Gravel pits around the main and start-up transformers were not included in the LRA. In the RAI response dated February 26, 2001, applicant reported that this was an inadvertent omission. Per the applicant's response, gravel pits have been added to Table 3.6-20.

Sheet metal drip shields are credited in an SER as providing a fire protection function. These drip shields were not included in the LRA. An RAI was sent January 24, 2001, and the applicant responded in letter dated February 26, 2001, that the metal drip shields were inadvertently omitted

from the LRA. Per the applicant's response, sheet metal drip shields have been added to Table 3.6-17.

The pump casing for the jockey pump was not included in the LRA. An RAI was sent on January 24, 2001, and the applicant responded on February 26, 2001, that the jockey pump was omitted from the LRA. Per the applicant's response, jockey pump casing has been added to Table 3.4-14.

The fire hose racks, which are typically used to store fire hoses, were not listed in Table 3.4-14, as being subject to AMR. An RAI was sent to the applicant in the letter dated January 24, 2001. The applicant responded in the RAI response dated February 26, 2001, that the fire hose racks were included as components, the valves were included as component type, "Valve" in Table 3.4-14, and the racks are included as component type, "Non-safety-related supports," "Carbon steel," in Table 3.6-3. Therefore, since the fire hose racks are included as separate components in the AMR, the staff finds this response acceptable.

The fire barriers which enclose the Cable Spreading Room are not specifically addressed in the LRA. These barriers ensure that Halon concentration is maintained in order that Halon may perform its fire suppression function. The applicant was asked if these barriers were considered in the AMR, in letter dated January 24, 2001. The applicant responded to the RAI in letter dated February 26, 2001, that the reinforced concrete beams, columns, walls, floors/slabs, and fire doors are within the scope of license renewal and are included in the LRA, Tables 3.6-5 and 3.6-12. Therefore, since the fire barriers are included in the LRA, the staff finds this response acceptable.

After the staff determined which components were within the scope of license renewal, the staff determined whether the applicant properly identified the components subject to an AMR from among those identified as being within the scope of licence renewal. The staff reviewed selected components that the applicant identified as being within the scope of license renewal to verify that the applicant had identified these components as subject to an AMR if they perform intended functions without moving parts or without a change in configuration or properties, and are not subject to replacement on the basis of a qualified life or specified time period. The staff did not identify any other omissions of passive and long-lived components with fire protection intended functions.

2.3.3.14.3 Conclusion

On the basis of its review of the contents in the LRA and response to RAIs, the staff concludes that there is reasonable assurance that the applicant has appropriately identified the portions of the FP system piping and components that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4. In addition, the staff concludes that there is reasonable assurance that the applicant has appropriately identified the components for the FP system that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.15 Emergency Diesel Generators and Support Systems

In the LRA, Section 2.3.3.15, the applicant described the components of the EDGs and their support systems that are within the scope of license renewal and subject to an AMR. The design of the EDG is described in UFSAR Section 8.2.2.1.1.1 and the EDG support systems are

described in UFSAR Section 9.15. The staff reviewed the UFSAR and the LRA to determine whether the applicant has adequately demonstrated that the requirements of 10 CFR Part 54 have been met.

2.3.3.15.1 Technical Information in the Application

The EDGs provide AC power to the onsite electrical distribution system to assure that the reactor can be shut down in a safe and orderly manner when offsite power is unavailable. The EDG support systems needed to ensure that the EDGs can perform their function are:

- Air intake and exhaust
- Air Start
- Fuel oil
- Cooling Water
- Lube oil

The applicant described the process for identifying the EDG support system structural components within the scope of license renewal in LRA Section 2.1.2. Using the methodology described in Section 2.1.2, the applicant compiled a list of structural component/commodity groupings within the license renewal boundaries that are subject to an AMR, and identified their intended functions. The applicant listed the EDG support system components/groups in Table 3.4-15 of the LRA. The table listed the structural components of each support system individually.

The air intake/exhaust system provides combustion air to the diesel engines and includes six components that perform an intended function: (1) exhaust piping, fittings, and silencers; (2) air filter assemblies; (3) expansion joints; (4) flexible couplings; (5) tubing/fittings; and (6) bolting (mechanical closures). The intended function of these components is to provide the pressure boundary for the EDG air intake and exhaust. The air filter assemblies also provide filtration of the intake air to protect the diesel engines from contaminants.

The air start system provides the motive force to start the diesel engines and includes seven components that perform an intended function: (1) air start accumulators; (2) air start motors; (3) air start system lubricators, (4) valves, piping/fittings, tubing/fittings, and governor bypasses; (5) filters; (6) flexible hose; and (7) bolting (mechanical closures). The intended function of these components is to provide the pressure boundary for the air start system. The filters also provide filtration to prevent contaminants from entering the diesel engines.

The fuel oil system provides the diesel fuel oil to the EDG diesel engines and includes eleven components that perform an intended function: (1) Unit 3 diesel oil storage tank; (2) Unit 4 diesel oil storage tanks; (3) EDG fuel oil pumps, (4) diesel oil day tanks; (5) diesel oil skid tanks; (6) carbon steel valves, piping/fittings, and sight glasses; (7) stainless steel valves piping/fittings, tubing/fittings, flexible hose, filters, and sight glasses; (8) copper tubing/fittings; (9) filters; (10) flame arresters; and (11) bolting (mechanical closures). The intended function of these components is to provide the pressure boundary for the EDG fuel oil system. The filters also provide filtration to prevent contaminants from entering the diesel engines. The flame arresters also prevent the spread of fire.

The cooling water system provides cooling to the diesel engines to prevent overheating and includes eleven components that perform an intended function: (1) cooling water expansion tanks;

(2) cooling water pumps; (3) cooling water immersion heaters; (4) radiator water boxes; (5) radiator tubes; (6) carbon steel valves, piping/fittings, and tubing/fittings; (7) stainless steel tubing/fittings and flexible hoses; (8) orifices; (9) copper alloy valves and sight glasses; (10) flexible rubber hoses; and (11) bolting (mechanical closure). The intended function of these components is to provide the pressure boundary for the EDG cooling water system. The radiator tubes also provide heat transfer. The orifices provide throttling.

The lube oil system provides lubricating oil to the diesel engine and includes nine components that perform an intended function: (1) lube oil pumps; (2) carbon steel heat exchanger shells; (3) brass heat exchanger tubing; (4) cast iron heat exchanger channel heads; (5) carbon steel valves, piping/fittings, flexible hoses and sight glasses; (6) filters; (7) stainless steel tubing//fittings; (8) orifices, and (9) bolting (mechanical closure). The intended function of these components is to provide the pressure boundary for the EDG lube oil system. The radiator tubes also provide heat transfer. The filters also provide filtration to prevent contaminants from entering the system. The orifices provide throttling.

Turkey Point Units 3 and 4 were originally designed with just two EDGs (now labeled 3A and 3B) that were shared between the two units. In 1990-1991, two more EDGs were installed as an upgrade to the emergency AC power system and labeled 4A and 4B, so that each unit now has two EDGs. As a result of the upgrade, the Unit 4 EDG systems which were built to the latest standards, contain some enhancements over the Unit 3 EDGs.

The combustion air intake and exhaust systems are similar for both Units. Each EDG has an independent system consisting of air intake duct work and exhaust piping fitted with silencers. Each Unit 3 EDG has an independent air start system. Each system consists of a motor-driven compressor, after cooler, air dryer, and two sets of two air receiver tanks that supply four air start motors. The receiver tanks can provide four unsuccessful start attempts (2 seconds each) and one successful start without a recharge. The Unit 4 air start system is similar to the Unit 3 system, with the added feature of a diesel-driven compressor as a back up to the motor-driven compressor.

The Unit 3 fuel oil system consists of a free-standing steel fuel oil storage tank, two fuel oil transfer pumps located near the storage tank, two day tanks inside the Unit 3 EDG building, and skid mounted tanks for EDG 3A and 3B. The Unit 4 fuel oil system consists of two independent systems for EDG 4A and 4B. Each system consists of an underground steel-lined concrete fuel oil storage tank (located below the Unit 4 EDG building), a fuel oil transfer pump, and a day tank that supplies fuel oil to the diesel engine.

Each Unit 3 EDG has its own independent self-contained forced circulation cooling water loop to remove heat from the intake air turbocharger after cooler, the engine water jackets, and lube oil system and transfers the heat to the radiator. Each loop consists of two gear-driven centrifugal pumps to circulate the water, an electric immersion heater to provide warming to the engine and lube oil in the standby condition, an expansion tank to allow expansion and contraction of the water in the loop as the loop temperature changes, an air cooled radiator, and two belt-driven cooling fans to circulate air over the radiator. The Unit 4 EDG cooling loops are similar to the Unit 3 cooling loop described above, with the exception that there are three motor-driven cooling fans to circulate air over the radiator in each loop.

Each Unit 3 EDG has its own lubrication system that consists of four subsystems: the scavenging oil system, main lube oil system, piston cooling system, and the soak back oil system. The scavenging oil system uses an engine-driven pump to force oil through the oil filter and the lube oil cooler. The main lube oil system supplies oil to most of the moving parts of the engine via the engine-driven main pressure pump. The piston cooling system uses an engine-driven pump to provide lubricating oil to each piston. The soak back oil system uses a motor-driven pump to supply lube oil to the turbocharger bearing and to circulate oil through the main lube oil filter and lube oil cooler when the engine is shut down to keep the engine warm during standby conditions. The Unit 4 EDG lubrication system is similar to Unit 3 with the exception that the soak back oil system employs separate ac motor-driven pumps for the turbocharger and the circulation of oil through the main filter and lube oil cooler. In addition, each of these pumps has a back up dc motor-driven pump to ensure that oil is circulated through the turbocharger, the filter, and lube oil cooler when the engine is in a standby condition.

2.3.3.15.2 Staff Evaluation

The staff reviewed Section 2.3.3.15 of the LRA and the Turkey Point UFSAR to determine whether there is reasonable assurance that the applicant appropriately identified the EDG support system components within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and diagrams submitted by the applicant in Section 2.3.3.15 of the LRA and the Turkey Point UFSAR to identify if there were portions of the EDG support systems that the applicant did not identify as within the scope of license renewal that perform intended functions. Only those portions of the EDG support systems that perform at least one intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.3.3.15 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the EDG support systems that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional system functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff questioned the omission of the alternate fuel oil fill lines for the Unit 3 EDG from the scope of license renewal. The Unit 4 EDG's are not affected because their underground storage tanks are missile protected. Thus, the Unit 4 EDG's are assured of adequate fuel oil for 7 days of operation.

In a letter dated January 17, 2001, the staff requested additional information concerning the ability to supply the Unit 3 EDG with fuel oil following a design basis tornado. UFSAR Appendix 5-E states that several safety-related components associated with the Unit 3 EDG are not protected from missiles, including the outdoor fuel oil storage tank and associated valves, as well as both diesel fuel transfer pumps and associated piping. If this equipment is damaged, the UFSAR states that the fuel oil day tanks contain sufficient inventory to allow operation of the Unit 3 EDGs until either a mobile fuel oil tank could supply additional fuel oil, or a cross-tie from the Unit 4 storage tanks could be implemented. However, the drawings submitted with the LRA (3-EDG-03 and 3-EDG-04), indicate that the alternate truck fill lines located at the diesel oil storage tank (3T36) and the individual day tanks (3T23A and 3T23B), and the Unit 4 cross-tie piping are not safety-related, and are not included within the scope of license renewal. The staff requested that

the applicant provide the basis for omitting the equipment needed to provide a 7-day supply to the Unit 3 EDGs in case of missile damage to the safety-related components.

The applicant responded to the RAI in a letter dated February 16, 2001. The alternate fill connections located at the individual day tanks (3T23A and 3T23B), described in UFSAR 9.15.1.2.1.3, can be used to fill the Unit 3 day tanks from a mobile tank unit in the unlikely event that the normal path is unavailable. These alternate fill connections at the day tanks meet the missile protection criteria of the UFSAR. As a result, these components were included in the scope of license renewal. The boundary drawings, 3-EDG-03 and 3-EDG-04, should show the diesel oil day tank alternate fill lines, including valves 3-70-245, 246, 247 for EDG 3A, and 3-70-248, 249, and 250 for EDG 3B, and their associated piping and fittings as being in the scope of license renewal. Additional capability to supply fuel oil from an alternate truck fill line located at the Unit 3 diesel oil storage tank (3T36) and the Unit 4 cross-tie provide flexibility and redundancy, and may be used during normal plant operation. However, these alternate pathways are not missile protected, and therefore not included within the scope of license renewal because they do not perform or support any intended functions within the scope of 10 CFR 50.54.4.

The staff agrees that the diesel oil day tank alternate fill line components described above have been included in the scope of license renewal. Based on the components identified in LRA Table 3.4-15, there is reasonable assurance that the applicant adequately identified all portions of the EDG support systems that fall within the scope of license renewal in accordance with 10 CFR Part 54.4.

On the basis of this review, the staff found that the applicant properly identified the EDG building structural components subject to an AMR. The applicant's response to RAI 2.4.2.8-1 indicated that the valves, piping, and fittings associated with both of the Unit 3 EDG day tank alternate fill lines are included in the AMR for Section 3.4 of the LRA, "Emergency Diesel Generators and Support Systems."

2.3.3.15.3 Conclusion

On the basis of the review of Section 2.3.3.15 of the LRA, and Sections 8.2.2.1.1.1 and 9.15 of UFSAR, described above, the NRC staff has determined that there is reasonable assurance that the applicant adequately identified those portions of the EDG support systems that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.3.4 Steam and Power Conversion Systems

Turkey Point steam and power conversion systems are designed to remove heat from the reactor coolant system and convert the heat to the plant's electric output. In the LRA, Section 2.3.4, "Steam and Power Conversion System," the applicant describes these systems, and identifies the components from these systems that are within the scope of license renewal and subject to an AMR. The applicant describes its process for identifying the mechanical components within the scope of license renewal and subject to an AMR in the LRA, Section 2.1 "Scoping and Screening Methodology."

2.3.4.1 Summary of Technical Information in the Application

In the LRA, Section 2.3.4, the applicant describes the steam and power conversion systems and identifies the following subsystems that are within the scope of license renewal:

- main steam and turbine generators
- feedwater and blowdown
- auxiliary feedwater and condensate storage

In the LRA, Table 2.3-6, the applicant provides a list of scoping drawings, consisting of the flow diagrams for the above three subsystems that are within the scope of license renewal. The applicant provided a highlighted set of these drawings with the LRA, to show the portions of these systems that are within the scope of license renewal. From the components highlighted in these drawings, the applicant provided lists of the component groups that are subject to an AMR in the LRA, Table 3.5-1 through Table 3.5-3 for the main steam and turbine generators, feedwater and blowdown, auxiliary feedwater and condensate storage, respectively.

In the LRA Section 2.3.4.1, the applicant describes that the main steam system provides the principal heat sink for the reactor coolant system protecting the reactor coolant system and the steam generators from overpressurization, provides isolation of the steam generators during a postulated steam line break, and provides steam supply to the auxiliary feedwater pump turbines. Turbine generators convert the steam input from main steam system to the plant electrical output, provide first-stage pressure input to the reactor protection system, and provide isolation under certain postulated steam line break scenarios. The main steam system and turbine generators are described in UFSAR Section 10.2.2.

The applicant has determined that the components of main steam system and turbine generators subject to an aging management review include the following: valves (pressure boundary only), steam traps, flow elements, piping, tubing and fittings, bolting (mechanical closures). The intended functions for these components are pressure boundary integrity and throttling. The components of main steam system and turbine generators that are subject to an AMR along with the intended functions of these components are listed in Table 3.5-1 of the LRA.

In the LRA Section 2.3.4.2, the applicant describes that the feedwater and blowdown system provides sufficient water flow to the steam generators to maintain an adequate heat sink for the reactor coolant system, provide feedwater and blowdown isolation following a postulated loss-of-coolant accident or steam line break event, and assist in maintaining steam generator water chemistry. The feedwater and blowdown system consists of main feedwater; steam generator blowdown; and standby steam generator feedwater. The main feedwater system supplies pre-heated, high-pressure feedwater to the steam generators. The feedwater flow rate is controlled by the steam generator level control system which determines the desired feedwater flow by comparing the feed flow, steam flow, and steam generator level. The main feedwater system is described in UFSAR Section 10.2.2. The steam generator blowdown system assists in maintaining required steam generator chemistry by providing a means for removal of foreign matter that concentrates in the evaporator section of the steam generator. The steam generator blowdown system is fed by three independent blowdown lines (one per steam generator), which tie to a common blowdown flask. The steam generator blowdown is continuously monitored for radioactivity during plant operation. The steam generator blowdown system is described in UFSAR Section 10.2.4.3.

Standby steam generator feedwater supplies steam generator feedwater during normal startup, shutdown, and hot standby conditions. Standby steam generator feedwater delivers sufficient feedwater to maintain one unit at hot standby while providing makeup for maximum blowdown. The standby steam generator feedwater pumps take suction from the demineralized water storage tank and discharge to a common header upstream of the feedwater regulating valves. Standby steam generator feedwater is described in UFSAR Section 9.11.

The applicant has determined that the components of feedwater and blowdown components subject to an aging management review include the demineralized water storage tank, pumps and valves (pressure boundary only), orifices, piping, tubing, and fittings. The intended functions for these components are pressure boundary integrity and throttling. The components of the feedwater and blowdown system that require an AMR along with the intended functions of these components are listed in Table 3.5-2 of the LRA.

In the LRA, Section 2.3.4.3, the applicant describes that the auxiliary feedwater system supplies feedwater to the steam generators when normal feedwater sources are not available, provides for auxiliary feedwater steam and feedwater isolation during a postulated steam generator tube rupture event, and provides for auxiliary feedwater isolation to the faulted steam generator and limits feedwater flow to the steam generators to limit positive reactivity insertion during a postulated steam line break event. The auxiliary feedwater system is a shared system between Turkey Point Units 3 and 4. The auxiliary feedwater system contains three steam turbine driven pumps. The pumps can be supplied steam from the steam generators in either unit. The pumps take suction from either condensate storage tank and discharge to one of two redundant headers. Each header can supply each steam generator. The auxiliary feedwater system is normally maintained in standby with one pump aligned to one discharge header and two pumps aligned to the other header. Upon initiation, all three pumps start to supply the affected steam generator with feedwater. The auxiliary feedwater system is described in UFSAR Section 9.11.

The condensate storage system stores water for use by auxiliary feedwater to support safe shutdown of the plant. Condensate storage consists of a condensate storage tank on each unit with piping that feeds all three auxiliary feedwater pumps. The tank outlet piping is cross-connected between the units so that either tank can supply the water required by auxiliary feedwater. Condensate storage is described in UFSAR Section 9.11.3.

The applicant has determined that the components of auxiliary feedwater and condensate storage components subject to an aging management review include: condensate storage tanks, pumps and valves (pressure boundary only), coolers, orifices, piping, tubing, and fittings. The intended functions for these components are pressure boundary integrity, heat transfer, and throttling. The components of the auxiliary feedwater and condensate storage system that require an AMR and the intended functions of these components are listed in Table 3.5-3 of the LRA.

2.3.4.2 Staff Evaluation

The staff reviewed the above information to verify that the applicant identified the components of the steam and power conversion systems that are within the scope of license renewal and subject to an AMR, in accordance with 10 CFR 54.4 and 10 CFR 54.21(a)(1).

The applicant identified and listed the components subject to an AMR for the steam and power conversion systems in Table 3.5-1 through Table 3.5-3 of the LRA using the screening methodology described in Sections 2.1 of the LRA. The screening methodology is evaluated by the staff in Section 2.1 of this SER.

The staff reviewed the applicable sections of Turkey Point UFSAR to determine if there were any system functions, not identified as intended function in accordance with 10 CFR 54.4. The staff then reviewed the following system drawings to verify that the applicant identified all the components within the scope of license renewal in accordance with 10 CFR 54.4:

Main Steam and Turbine Generators:

> Drawing Nos.: 3-MS-01, 3-MS-02, 3-MS-03, 3-SAMP-02, 3-TG-01, 4-MS-01, 4-MS-02, 4-MS-03, 4-SAMP-02, 4-TG-01;

Feedwater and Blowdown:

> Drawing Nos.: 0-FW-01, 0-FW-02, 3-FW-01, 3-FW-02, 3-FW-03, 3-FW-04, 4-FW-01, 4-FW-02, 4-FW-03, 4-FW-04; and

Auxiliary Feedwater and Condensate Storage:

> Drawing Nos.: 0-AFW-01, 0-AFW-02, 3-AFW-01, 3-AFW-02, 3-AFW-03, 3-COND-01, 4-AFW-01, 4-AFW-02, 4-AFW-03, 4-COND-01.

Further, the staff verified the accuracy of the system drawings, and completeness of LRA Table 3.5-1 through Table 3.5-3 by sampling the components adjacent to, but outside the highlighted portion of the system to verify that all the components within the scope of the license renewal were included in the applicants evaluation. In addition, the staff sampled the components that are within the scope of license renewal, but not subject to an AMR to verify that all of the components that meet the requirements of 10 CFR 54.21(a)(1) were subject to an AMR.

As a result of this review, the staff held a meeting with the applicant on January 4, 2001, and subsequently requested additional information in a letter to the applicant dated January 10, 2001. The applicant responded the staff's RAI in a letter to the NRC dated, February 8, 2001.

In RAI 2.3.4-1, the staff asked the applicant to explain why the air reserve tanks and associated piping for the main steam isolation valve (MSIV) instrument air of Unit 3 are not within the scope of license renewal and the nitrogen bottles for the MSIV instrument air of Unit 3 are not subject to an AMR. Performing the same function for the MSIV, the instrument accumulator tanks for Unit 4 are subject to an AMR. The applicant responded that the MSIV instrument air system for Unit 3 is designed differently from that for Unit 4. The instrument accumulator tanks for Unit 4 provide safety-related air for Unit 4 MSIVs. For Unit 3, the air reserve tanks are used for normal operation only, and do not perform any intended function identified in 10 CFR 54.4. Therefore, these air reserve tanks are not within the scope of license renewal. The safety related source of compressed gas for MSIV operation in Unit 3 is a high-pressure nitrogen bottle system. These nitrogen bottles in Unit 3 are not considered long-lived components and are replaced as required. Administrative controls provide for periodic monitoring and replacement as necessary to ensure the license renewal system intended function of the Unit 3 MSIVs are maintained. Therefore,

these nitrogen bottles are not subject to an AMR according to 10 CFR 54.21 (a)(1)(ii). The staff finds the response acceptable.

In RAI 2.3.4-2, the staff requested the licensee to justify its determination of the evaluation boundary around the demineralized water storage tank (DWST), which is identified as within the scope of license renewal. Specifically, the evaluation boundary for the tank and associated piping ended at several normally opened valves, such as DWDS-3-021, DWDS-020, DWDS-4-021, DWDS-064, DWDS-017, CDPL-4-029, and CDPL-3-029. It was not clear that a failure of the downstream non-safety-grade piping of these opened valves did not prevent the DWST from satisfactory performing its intended function as required by 10 CFR 54.4 (a)(2).

The licensee responded that the DWST provides the source of water for the non-safety-related standby steam generator feedwater. The DWST is in the scope of license renewal only because it provides water for fire protection for a postulated fire in the AFW pump area. The applicant established the license renewal boundaries associated with piping attached to the DWST at the first valve from the tank even if the valve is normally open. The applicant indicated that regardless of the condition of the piping downstream of the first valve, there will be sufficient water inventory available in the DWST for the intended function of fire protection because of the following reasons:

- Plant Technical Specification 3.7.1.6 requires a minimum water volume of DWST. Surveillance Requirement 4.7.1.6.1 requires this minimum water volume be verified at least once per 24 hours. The level of this tank is also communicated during shift turnover as part of the shift relief checklist. The DWST has low and low-low level alarm set points that annuciate in the control room. These alarms are well above the TS minimum level requirement. Because the tank volume is a TS requirement, any conditions associated with the downstream piping (not in scope), that result in loss of inventory, will be addressed by plant personnel by isolating the affected, non-essential lines connected to the tank.

- Less than one third of the DWST capacity is required to be maintained by TS 3.7.1.6; therefore, a large inventory margin exists.

- The license renewal system intended function for the RWST is required only for a postulated fire in the AFW pump area. In the current licensing basis of Turkey Point (UFSAR Appendix 9.6A), it is not required to postulate a failure of piping concurrent with a postulated fire per 10 CFR 50.48, 10 CFR 50 Appendix R.

Based on the applicant's justification, the staff finds its determination of DWST scoping boundary acceptable.

In RAI 2.3.4-3, the staff requested the licensee to justify its determination of the evaluation boundary for the steam generator blowdown system ending at several valves, SGML-3-011, SGML-3-031, SGML-3-049, SGML-4-011, SGML-4-031, and SGML-4-049. These valves are shown in Drawing Nos. 3-FW-04 and 4-FW-04 as normally opened. It was not clear that a failure of downstream piping of these valves did not affect the containment isolation function.

The licensee responded that the above valves are normally locked closed as shown in UFSAR Figures 10.2-55 and 10.2-56. These valves are only open when steam generator wet layup is in service, during outages when the plant is in Modes 5, 6, or defueled. Since these valves are

normally closed, the staff finds the scoping boundary established by the applicant acceptable. The staff recommends that the applicant revise Drawing Nos. 3-FW-04 and 4-FW-04 on the valve positions to be consistent with the current licensing basis.

In RAI 2.3.4-4, the staff requested the licensee to justify its determination of the evaluation boundary for the steam turbines for AFW pumps in Drawing No. 0-AFW-01. The evaluation boundary for the piping ended, in some cases, at the components such as open valves, flow reducers, or orifices (e.g. ST-49, ST-52, ST-46, 20-461C, 20-462C, RO-6265C, ..., etc.) that are not pressure boundary. It was not clear that a failure of downstream piping of these components did not affect the pressure integrity of the AFW system.

The applicant responded that the restrictive orifices at the discharge of the AFW turbines were designed and sized to provide for continuous drainage from the turbine to prevent accumulation of condenser/water. The orifices are sized such that failure of the downstream piping will not impede the function of the turbine. Similarly, this system is designed such that the amount of steam leakage through the small diameter piping (small open valves) is insignificant and does not affect the system and component function. Steam traps are closed valves that open to release any accumulated condensate/water. Once the condensate is removed, the steam trap (valve) automatically returns to the closed position. Based on the above, the piping and components downstream of the orifices and steam traps do not perform or support any license renewal system functions that satisfy the scoping criteria of 10 CFR 54.4, and therefore, are not within the scope of license renewal. Based on the applicant's justification, the staff finds its determination of the steam turbines scoping boundary acceptable.

The staff identified, in drawing No. 4-AFW-01, part of the flow path from steam generator A in location G3 as within the scope of license renewal, but not highlighted. In the meeting of January 4, 2001, the applicant clarified that the flow path is correctly identified as within scope based on the license renewal boundary flag. The highlight, which the applicant used as a technique to facilitate the review, was erroneously cut off prior to the boundary. In the meeting the applicant stated that they would expand the highlight to the license renewal boundary whenever the drawing is revised. The staff agrees with the applicant.

On the basis of the NRC staff's review of the LRA and associated drawings, the Turkey Point UFSAR, and the applicant's responses to RAIs, the staff did not identify any omissions from the components highlighted in the diagrams that identify the system level scoping boundaries. The NRC staff also compared the components listed in Tables 3.5-1 through 3.5-3 of the LRA and the components highlighted in the drawings, and found them consistent.

2.3.4.3 Conclusion

On the basis of the review of Sections 2.3.4, and Sections 10.2.2, 10.2.4.3, and 9.11 of the UFSAR the NRC staff has determined that there is reasonable assurance that the applicant has adequately identified the steam and power conversion systems components that are within the scope of the license renewal role and subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4 Scoping and Screening Results – Structures

2.4.1 Containment

The containment for each unit is a domed structures that houses the reactor vessel, reactor coolant system and supports, and other systems that interface with the reactor coolant system. The structures of the containment are divided into two classifications, i.e., containment structure and containment internal structures. The structural components of the containment are further grouped by material or function into component/commodity sets that require an AMR.

2.4.1.1 Containment Structure

In Section 2.4.1.1, "Containment Structure," of the LRA, the applicant described the containment structure and identified its structural components that are within the scope of license renewal and subject to an AMR. The design of the containment structure is described in Sections 5.1.2 and 5.1.6 of the UFSAR. The staff reviewed the information submitted by the applicant to determine whether the applicant has adequately demonstrated that the requirements of 10 CFR 54.4 and 10 CFR 54.21 have been met for the containment structure and its associated structural components.

2.4.1.1.1 Technical Information In the Application

In Section 2.4.1.1 of the LRA, the applicant states that the containment structure consists of a post-tensioned reinforced concrete cylindrical shaped wall, a shallow dome roof, and a reinforced concrete foundation slab. The containment is designed as a Seismic Category 1 structure that withstands all applicable loads without loss of function and prevents uncontrolled release of radioactive material as a result of a specified seismic event. The applicant has determined that seismic Category 1 structures meet the intent of 10 CFR 54.4(a)(1) and are within the scope of license renewal.

The internal surfaces of the containment, including wall, roof, and foundation, are lined with a carbon steel liner to maintain a high degree of leak-tightness. The external surface of the liner plates, except for the floor liner, is coated on the inside with inorganic zinc primer and painted. The liner plate for the floors is placed on top of the foundation concrete pour and is covered with an additional concrete floor cover. The boundary of the containment includes all the penetration assemblies that penetrate the containment wall, such as mechanical penetrations, electrical penetrations, the equipment and personnel hatches.

Various penetrations through the containment boundary provide for the passage of piping and electrical conduits. These penetrations are designed to maintain an essentially leak-tight barrier to prevent uncontrolled release of radioactivity. The mechanical penetrations are rigid welded type assemblies that are solidly anchored to the containment wall. The electrical penetrations consist of carbon steel pipe canisters with stainless steel or carbon steel header plates welded to each other. A fuel transfer tube penetrates the containment to link the refueling canal inside the containment and the SFP in the auxiliary building. During normal operation, blind flanges are installed on the fuel transfer tube to serve as a containment isolation barrier. The fuel transfer tube is addressed in Sections 6.6.2 and 6.6.3 of the UFSAR . Other penetrations are addressed in Sections 5.1.5.2 and 5.1.5.3 of the UFSAR,.

There are two personnel hatches and an equipment hatch at the containment cylindrical wall. The equipment hatch is a large flanged penetration that provides access to the containment interior at the mezzanine level. A double-gasket dished head steel plate seals the opening. A double O-ring seal (with the O-rings in grooves in the head flange) makes up the final seal. The personnel hatch is a cylindrical tube that passes through the containment wall and is welded to the steel liner. The cylinder has doors at each end that is mechanically interlocked. The mechanical interlock permits one door open with the other door closed. The personnel escape hatch is a cylindrical tube that passes through the concrete wall of the containment and is welded to the liner. The tube has a circular door opening at each end. Each door is provided with double gaskets that are sealed with double O-rings. The machined surface of the doorplate seals the opening against the O-rings when the door is locked. The equipment hatch and personnel hatch are addressed in Section 5.1.5.1 of the UFSAR.

The applicant has determined that all the structural components and commodities of the containment structure are within the scope of license renewal because they perform one or more of the following intended functions which meet the 10 CFR 54.4 criteria:

- Provide a leak-tight pressure boundary and/or fission product barrier.
- Provide structural support to safety-related components.
- Provide shelter/protection to safety-related components (including radiation shielding).
- Provide a rated fire barrier to retard spreading of a fire.
- Provide a missile barrier.
- Provide structural support to non-safety-related components whose failure could prevent. Satisfactory accomplishment of any of the required safety-related functions.
- Provide a flood protection barrier.
- Provide structural support and/or shelter to components required for fire protection, anticipated transient without scram, and/or station blackout events.
- Provide pipe whip restraint and/or jet impingement protection.

In Table 3.6-2 of the LRA, the applicant lists the structural components and commodities that are subject to an AMR for both the containment structure and containment internal structures. The applicant further grouped them into 36 structural components or unique commodities. These components and commodities meet the criteria of 10 CFR 54.21(a)(1) because they perform applicable intended functions without moving parts or without a change of configuration or properties, and they are not replaced based on a qualified life or specified time period.

2.4.1.1.2 Staff Evaluation

The staff reviewed Section 2.4.1.1 of the LRA and the UFSAR to determine whether the applicant has adequately implemented its methodologies as described in Section 2.1 of the LRA so that there is reasonable assurance that the structural components and commodities of the

containment have been properly identified as being within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4 and 10 CFR 54.21, respectively. After completing its initial review, the staff issued request for additional information (RAI) in a letter to the applicant dated February 2, 2001. The applicant responded to the staff's RAI in a letter to the NRC dated March 1, 2001.

The staff reviewed the information in Section 2.4.1.1 of the LRA, Sections 5.1.2 and 5.1.6 of the UFSAR, and additional information submitted by the applicant in response to the staff's RAIs to determine if there were any structures or components within the containment boundary that the applicant did not identify as being within the scope of license renewal or as being subject to an AMR. On the basis of this review, the staff has made the findings described below.

The lower tendon access galleries are the reinforced concrete enclosure constructed at the underside of the containment foundation slab perimeter. The tendon galleries serve as the access to the lower vertical tendon anchorage for tendon inspection and surveillance. In Section 2.4.1.1.1 of the LRA, the applicant states that the lower tendon access galleries and the inspection pits do not support the intended function of the containment structure and are not within the scope of license renewal. The staff reviewed this information and found that the tendon gallery protects the bottom anchorages of the tendons and provides access for tendon anchorage inspection. The staff agrees that the tendon access gallery does not have to be within the scope of license renewal because it does not perform a containment pressure boundary function or any other function under 10 CFR 54.4.

Waterproofing membranes and water-stops are used underneath the foundation mat and outside the lower portion of the containment wall. They were installed at the connections between the pit walls and base mat of the tendon gallery to inhibit the intrusion of groundwater. In Section 2.4.1.1.1 of the LRA, the applicant states that the waterproofing membranes and water-stops are piece parts and are not identified as a unique commodity within the scope of license renewal. The staff considers that the water-stops are important in maintaining the integrity of the components to which they connect. Groundwater in-leakage into the concrete construction joints could occur as a result of degradation of the water-stops. The staff asked the applicant why the water-stops are not considered as a unique commodity within the scope of license renewal.

In its response, the applicant stated that the systems and structures monitoring program is credited to manage the aging of concrete structures below the groundwater level. The program will monitor degradation of the waterproofing membranes and water-stops by identifying evidence of groundwater in-leakage at accessible internal surfaces of the tendon gallery walls below the groundwater level. The applicant has determined that the tendon gallery is not within the scope of license renewal because it is not part of the containment pressure boundary. The staff reviewed this information and found that excluding the waterproofing membranes and water-stops from the scope of license renewal is acceptable because degradation of the water-stops will not affect the containment integrity.

Section 2.4.1.1.1 of the LRA states that the load-carrying capacity of the containment liner plate anchorages is required to support equipment, such as the polar crane. The staff asked if there are any other cranes or load-carrying supports attached to the liner plate that are within the scope of license renewal. In its response, the applicant stated that the polar crane is the only crane attached to the liner plate. The polar crane support brackets penetrate through the containment liner plate and are embedded in the containment concrete wall. Other attachments, such as pipe

supports and structural steels attached to the liner plate, are also anchored in the concrete. The applicant indicated that all the containment liner anchorages and embedment are within the scope of license renewal with no exception.

Table 3.6-2 of the LRA lists the mechanical piping penetrations, mechanical ventilation penetrations, and electrical penetrations as components that are subject to an AMR. The staff reviewed these penetrations to determine whether the applicant had properly identified the components of the penetrations that are subject to an AMR from among those containment penetrations within the scope of license renewal. The staff found that these penetrations are not individually described in the LRA and there is no reference which can be used to determine whether the applicant has properly identified the components subject to an AMR. However, Section 2.3.2.3 of the LRA states that all the containment penetrations and associated containment isolation valves and components that ensure containment integrity, regardless of where they are described, require an AMR. The applicant has determined that all the penetrations and associated components at the containment wall are in-scope and subject to an AMR for license renewal. Therefore, the staff determines that the applicant made no omissions in scoping the containment penetrations. These penetrations are part of the containment isolation system which is described in Section 6.6 of the USAR.

Table 3.6-2 of the LRA lists blind flanges as the components of the fuel transfer tube that are subject to an AMR for license renewal. The closures between the fuel transfer tube and the sleeves that are welded to the liner plate are not listed as components requiring an AMR. The applicant indicated that only the blind flanges are included within the containment pressure boundary for license renewal. The staff review found that the fuel transfer tube and its attachments are also within the scope of license renewal and subject to an AMR and are evaluated in Section 2.4.2.14 of this SER as part of components of the spent fuel storage and handling system.

In Table 3.6-2 of the LRA, the personnel hatch, emergency escape hatch, and equipment hatch are listed as components of the containment structure within the scope of license renewal. However, the applicant did not explain which of the subcomponents of the hatches require an AMR. The staff asked the applicant whether the hatch door interlock systems, equalizing valves, door seals, and operation mechanisms (such as gears, latches, hinges) are in-scope and subject to an AMR for license renewal.

In its response, the applicant stated that hatch door interlocks are active components and, therefore, do not require an AMR. Hatch valves that perform a containment pressure boundary isolation function are within the scope of license renewal and are listed in Table 3.3-3 of the LRA with the components of the containment purge system. Hatch seals are within the scope of license renewal and are listed in Table 3.6-2 of the LRA. Operation mechanisms (e.g., gears and linkages) that function to open and close the hatches are active components and do not require an AMR. However, the active mechanisms, such as latches and hinges, that are required to maintain the hatch in the closed position are within the scope of license renewal and are listed as part of the hatch in Table 3.6-2 of the LRA.

The staff reviewed the response in which the applicant identified certain active subcomponents that perform a passive function associated with maintaining the hatch in the closed position while others (e.g., gears and linkages) do not maintain the hatch in the closed position. The staff will verify the functions of the hatch subcomponents during the upcoming AMR inspection.

The staff has reviewed the information presented in Section 2.4.1.1 of the LRA, the UFSAR, and the additional information submitted by the applicant in response to the staff's RAIs. The staff finds that the applicant made no omissions in scoping the containment structure and components for license renewal. The staff's review also found that all the passive SCs identified as being within the scope of license renewal were subject to an AMR.

2.4.1.1.3 Conclusion

On the basis of this review, the staff concludes that there is reasonable assurance that the applicant has adequately identified the containment structure and its associated structural components within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.1.2 Containment Internal Structural Components

In Section 2.4.1.2, "Containment Internal Structural Components," of the LRA, the applicant described the containment internal structures and identified the structural components that are within the scope of license renewal and subject to an AMR. The design of the containment internal structures is described in Sections 5.1.2 and 5.1.9 of the USAR. The staff reviewed this information provided by the applicant to determine whether the applicant has adequately demonstrated that the requirements of 10 CFR 54.4 and 10 CFR 54.21 have been met for the containment internal structures.

2.4.1.2.1 Technical Information in the Application

In Section 2.4.1.2 of the LRA, the applicant states that the containment internal structures consist mainly of the reactor primary shield wall, the lower secondary compartment, the upper secondary compartments, the refueling cavity, and the reactor coolant system supports.

The primary shield wall is a 7-ft thick cylindrical wall enclosing the reactor vessel that provides biological shielding and structural support. The lower secondary compartment consists of the secondary shield walls that support the intermediate floor at elevation 30'-6" and encloses the reactor coolant loops. There are four upper secondary compartments. Three of them enclose one reactor coolant loop each and the fourth encloses the pressurizer. The secondary compartment walls support the operating floor at elevation 58'-0" and provide secondary biological shielding. The primary and secondary shield walls and the operating floor also serve as missile barriers to prevent missiles generated by high-pressure equipment from damaging the containment liner, pipe penetrations, and the required engineered safeguard systems.

The refueling cavity (refueling canal) is a stainless-steel-lined reinforced concrete pool above the reactor for refueling purposes. The irregularly shaped pool, formed by the upper portions of the primary shield wall and other sidewalls of varying thicknesses, contains the space for storing the upper and lower reactor internals packages and miscellaneous refueling tools. A removable reinforced concrete cover, located above the reactor vessel head, is provided to block any postulated missile generated by the control rod drive mechanisms.

The reactor coolant system (RCS) supports include the supports for the reactor pressure vessel, steam generators, reactor coolant pumps, and the pressurizer. The reactor pressure vessel (RPV) is supported and restrained on its six nozzles, which provide vertical and tangential support

to restrain the RPV for all the design loads. The support components are located near the beltline region of the RPV under the RPV nozzles. Each nozzle bears on three rollers set on a girder which is carried by three beams cantilevered from the primary shield wall. A shear lug on either side of the nozzle shoe provides tangential restraint. There are no vertical holddown clamps to resist upward forces because the dead weight of the reactor vessel and the rigid primary-loop pipes provide enough resistance against uplift.

The steam generator (SG) support restrains the SG for all design loading conditions and allows free thermal expansion of the RCS piping and the SG itself. Each SG has four support lugs near its bottom. Each lug is bolted to the horizontal web of a T-shaped weldment that is vertically supported by twin columns and horizontally restrained by another plate anchored in the concrete slab surrounding the reactor vessel. The four T-shaped weldments and the associated bearing plates constitute the bottom vertical and lateral support. An upper support, consisting of a ring girder, transfers lateral loads in all directions from the SG to the operating floor slab through embedded steel plates.

The reactor coolant pump (RCP) support restrains the RCP for all design loading conditions while allowing free thermal expansion of the RCS piping and the RCP itself. The RCP is supported by three support lugs, each of which is supported on twin columns with a T-shaped plate weldment and laterally restrained and bolted into the surrounding reinforced concrete structure which is similar to the lower lateral supports of the steam generators. Axial thermal expansion of the coolant pipe, radial expansion of pump casing, and upward expansion of the support columns are permitted by the same combination of slotted holes and lubricated plates as is used in the steam generator supports.

The pressurizer support restrains the pressurizer for all design loading conditions while allowing free movement of the pressurizer under the range of temperatures encountered during plant operation. The pressurizer is supported at the base with skirt support and the skirt is bolted onto the concrete floor. Lateral support near the center of gravity of the pressurizer is provided to resist seismic loads. There is no upper support.

To evaluate aging of the reactor coolant system supports, Westinghouse developed WCAP-14422, "License Renewal Evaluation: Aging Management For Reactor Coolant System Supports." The technical report is generically applicable to domestic commercial nuclear power plants that began operating from 1968 to 1996 with the Westinghouse nuclear steam supply system, including Turkey Point 3 and 4. The report is used as a reference for the license renewal application.

Other containment internal structures, such as concrete walls, floors, beams, equipment pads, and steel structures, are of conventional design and provide support for the systems, components, equipment, and concrete floors. There are steel structures inside the containment to allow access to the various elevations for inspection and maintenance and to support the safety-related and non-safety-related systems, components, and equipment, such as piping, ducts, miscellaneous equipment, electrical cable trays and conduits, instruments and tubing, and enclosures and racks for the electrical components and instrumentation. The associated components of these steel structures include steel beams and columns, stairways, ladders, and the attachments of the concrete walls and liner.

2.4.1.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.1.2 and the UFSAR to determine if there is reasonable assurance that the applicant has identified the SCs comprising the containment internals that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4 and 10 CFR 54.21, respectively. After completing its initial review, the staff requested additional information relating to the containment internals in a letter to the applicant dated February 2, 2001. The applicant responded to the staff's questions in a letter to the NRC dated March 1, 2001.

The applicant listed the structural components and commodities that are subject to an AMR in Table 3.6-2 of the LRA and listed their intended functions in Table 3.6-1 of the LRA. The staff reviewed the information submitted by the applicant and found that the grouping of the structural components and commodities was correct, except that the following areas need to be verified.

Section 2.4.1.2 of the LRA did not address the control rod drive service structure. In RAI 2.4.1-5, the staff asked whether the control rod drive service structures are within the scope of license renewal. In its response, the applicant stated that the control rod drive mechanism (CRDM) housings which serve the pressure boundary function are described in Section 2.3.1.5 of the LRA. They are the Seismic Category 1 structural components. The CRDM housings are supported by the reactor vessel closure head at the bottom and by lateral supports at the top. The lateral supports consist of a platform assembly and struts. The struts span the platform assembly and the reactor cavity wall. These supports are included within the scope of license renewal and are subject to an AMR. The structural components for the CRDM housings are included in Table 3.6-2 as the commodity group under the label "Safety Related Piping and Component Supports." The staff reviewed the information provided by the applicant and did not identify any omissions by the applicant for the control rod drive service structures.

Table 3.6-2 of the LRA lists the reactor vessel supports, steam generator supports, pressurizer supports, reactor coolant pump supports, and surge line supports as components of the containment internal structures subject to an AMR. However, Section 2.4.1.2.2 of the LRA did not describe these structures. In RAI 2.4.1-4, the staff asked that the applicant provide additional information on the the reactor coolant system supports and their boundaries that are in-scope and are subject to an AMR for license renewal.

In its response, the applicant stated that the reactor coolant system supports are described in Section 4.2 of the USAR. Additional descriptions and figures are provided in WCAP-14422. Specifically, Table 2-2 of WCAP-14422 provides the primary component support configuration classification applicable to Turkey Point Units 3 and 4. In Section 2.4.1.2.2 of the LRA, the applicant also states that the design of the Turkey Point reactor coolant system supports and their intended functions are consistent with the descriptions contained in WCAP-14422. The reactor coolant system support boundaries subject to an AMR include all structural support items between the reactor coolant system components and the containment concrete structure up to, but not including, the integral attachments that are on the reactor coolant system components. The integral attachments on the reactor coolant components are reviewed with the components and the concrete structure is reviewed with the containment structure.

The staff reviewed the portion of WCAP-14422 that is applicable to the Turkey Point plant to determine whether the report has provided the required information to support this review. The staff also reviewed Section 4.2 of the USAR on the portions that were not addressed in the LRA to determine whether they are within the scope of license renewal. The staff summarized the technical information from the WCAP, the UFSAR, and the applicant's responses in Section 2.4.1.2.1 of SER. The staff found that some of the structural components normally associated with the reactor coolant system supports were included by the applicant in other sections of the LRA for scoping purposes. However, the applicant has determined that all the structural support items related to the reactor coolant system supports are within the scope of license renewal and subject to an AMR. Therefore, the staff found no omissions by the applicant.

There are two recirculating sumps in the containment and each has a line to the suction of the RHR pumps. The containment sumps are described in Sections 6.2.1 and 6.4.2 of the USAR. In Table 3.6-2 of the LRA, on sump screens are listed as the components subject to an AMR, but the sump itself is not included. The staff's review found that the containment sumps are in-scope and subject to an AMR for license renewal as part of the containment concrete floor.

2.4.1.2.3 Conclusion

Based on the above review, the staff has reasonable assurance that the applicant has properly identified the containment internal SCs that are within the scope of license renewal.

2.4.2 Other Structures

The other structures within the scope of license renewal are the passive, long-lived structures other than the containment and containment internals. The applicant has determined that the following structures are included in the scope of license renewal: auxiliary building, cold chemistry laboratory, control building, cooling water canals, diesel driven fire pump enclosure, electrical penetration rooms, EDGB, fire protection monitoring station, fire rated assemblies, intake structure, main steam and feed-water platforms, plant vent stack, spent fuel storage and handling, turbine building, turbine gantry cranes, Turkey Point Units 1 and 2 chimneys, and yard structures.

2.4.2.1 Auxiliary Building

In LRA Section 2.4.2.1, "Auxiliary Building," the applicant describes the auxiliary building structure and identifies the structural components of the auxiliary building that are within the scope of license renewal and subject to an AMR. The applicant states that the fuel handling building structure (including the concrete SFP and the reinforced concrete overhead sliding doors) is within the auxiliary building. Therefore, the fuel handling building structure is addressed in section 2.4.2.1 as a structural component in the auxiliary building. The design of the auxiliary building and its structural components, including the fuel handling building (the SFP), that are housed within the auxiliary building are described in Sections 5.2 and 9.5 of the UFSAR, respectively.

2.4.2.1.1 Summary of Technical Information in the Application

In LRA Figure 2.2-1, Turkey Point Plant Structures," the applicant depicts the general location of the auxiliary building. The auxiliary building is located adjacent to and east of the control building and is flanked on its northwest and southwest corners by the Unit 3 and 4 containment structures, respectively. The auxiliary building houses some safety-related Class I systems (CCW, SFP

cooling, chemical and volume control, primary water makeup, sample systems, waste disposal) and associated SCs that support normal operation, shutdown, and accident conditions. It is designed and constructed on a foundation mat with concrete bearing walls and slabs. It was built partially below grade. The construction joints of the exterior concrete wall contain a water-proofing membrane with concrete topping below the plant's design groundwater elevation. As stated in Section 5.2 in the UFSAR, certain portions of the auxiliary building structure and structural components are designed and constructed to Seismic Category I requirements. Seismic Category 1 structures are designed to prevent uncontrolled release of radioactivity and to withstand all applicable loads, including but not limited to system and seismic loadings, without loss of function. The applicant has determined that the Seismic Category 1 structural components of the auxiliary building meet the intent of 10 CFR 54.4(a)(1) for license renewal.

The structural components within the auxiliary building (i.e., the SFP and spent fuel storage pit) are lined with a seam-welded stainless steel plate liner and designed to withstand the earthquake loadings as Class I structures. The SFP and cask pit provide for underwater storage of spent fuel and control rods after they are removed from the reactor cavity. The spent fuel pit is lined with stainless steel and is used to store stainless steel storage racks that rest on the floor and hold fuel assemblies. The liner prevents leakage even in the event the reinforced concrete develops cracks. The applicant has determined that the liner is a Seismic Category I structure that meets the intent of 10 CFR 54.4(a)(1) for license renewal. The applicant listed the passive and long-lived components and commodities unique to the auxiliary building in Table 3.6-3. The applicant also determined that some areas in the auxiliary building (i.e., areas that serve as fire barriers) meet the scoping requirements of 10 CFR 54.4(a)(3) in that these components are relied upon in plant evaluations to perform functions compliant with 10 CFR 50.48. The fire barriers (i.e., fire retardant coatings, fireproofing, and fire doors) are grouped as fire-rated assemblies in Table 3.6-12, while fire walls and slabs are grouped as reinforced concrete components in Table 3.6.3. Fire barriers are addressed under Section 2.4.2.10 of this SER.

The applicant describes its methodology for identifying the structural components within the scope of license renewal in Section 2.1.1 of the LRA. Based on its scoping methodology, the applicant, in Section 2.2, Table 2.2-2, of the LRA, identifies the auxiliary building as being within the scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.1 of the LRA.

The auxiliary building and its structural components meet the intent of 10 CFR 54.4(a)(1) for license renewal because they perform one or more of the following functions:

- House and provide structural support to safety-related components.
- Provide shelter/protection of safety-related components (including radiation shielding).
- Provides a rated fire barrier to retard spreading of a fire.
- Provides a missile barrier.
- Provides structural support to non-safety-related components whose failure could prevent satisfactory accomplishment of required safety-related functions.
- Provides a flood protection barrier.

- Provides structural support and/or shelter/protection to components required for fire protection, anticipated transients without scram (ATWS), and/or station blackout events.

- Provides pipe whip restraints and/or jet impingement protection;

On the basis of the above-described methodology, the applicant identifies both the structural components and the commodity groups that make up the auxiliary building and identifies the intended functions of the structural components and commodity groups that are subject to an AMR in Table 3.6-3 in the LRA. Some of the structural components in the auxiliary building are common to many other buildings; however, they are uniquely identified as commodity group items in Table 3.6-3 of the LRA. The commodity group is addressed by the applicant in Section 2.4.6.2 of the LRA. As stated by the applicant, the SCs and commodities in the auxiliary building are subject to an AMR because they perform their intended functions without moving parts or without change in configuration or properties, and are not subject to periodic replacement based on a qualified life or specified time limit.

2.4.2.1.2 Staff Evaluation

The NRC staff reviewed Section 2.4.2.1 of the LRA and the supporting information in Sections 5.2 and 9.5 of the Turkey Point Unit 3 and 4 UFSAR to determine whether there is reasonable assurance that the SCs and commodities of the auxiliary building have been adequately identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff reviewed the structural component/commodity groupings in Table 3.6-3 (reinforced concrete foundations and walls; reinforced concrete foundation beams, columns, walls, floors/slabs; miscellaneous steel stairs, platforms, grating, etc.) to determine if there were any other components in the auxiliary building that meet the scoping criteria of 10 CFR 54.4(a) but were not included within the scope of license renewal. As a result of this review, the staff requested clarifying information regarding the auxiliary building and its structural components that serve as fire barriers. The applicant responded to the staff's concerns in a meeting on January 24, 2001. The applicant stated that the fire barriers and doors are not listed in Table 3.6-3 in the LRA as a commodity of the auxiliary building. Only the concrete structural components that serve as fire barriers are included in the commodity group in the auxiliary building. The fire barriers and doors, which are needed to protect safety-related SSCs by providing a rated fire barrier to confine a fire from spreading to adjacent areas of the plant of are listed in Table 3.6-12, "Fire Rated Assemblies," and evaluated under Section 2.4.2.10 this SER.

In LRA Section 2.4.2.1, the applicant states that the fuel handling building itself is within the scope of license renewal. Any associated fire walls and slabs within the fuel handling building are within the scope of license renewal and subject to an AMR. These components are addressed along with those for the auxiliary building in Table 3.6-3.

The staff has reviewed Section 2.4.2.1 of the LRA and the Turkey Point Unit 3 and 4 UFSAR. The staff also examined the components and commodities listed in Tables 3.6-3 and 3.6-12 of the LRA to determine if they are the only SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). On the basis of the above review, the staff did not identify any omissions by the applicant.

2.4.2.1.3 Conclusions

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has appropriately identified the portions of the auxiliary building, including the fuel handling building, that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.2.2 Cold Chemistry Laboratory

In Section 2.4.2.2, "Cold Chemistry Laboratory," of the LRA, the applicant described the structure of the cold chemistry laboratory and identified its structural components that are within the scope of license renewal and subject to an AMR.

2.4.2.2.1 Summary of Technical Information in the Application

The cold chemistry laboratory building, located southwest of the turbine building, is a non-safety-related reinforced concrete frame structure with a reinforced concrete roof. The laboratory is used to process the non-radioactive samplings. The laboratory building does not perform any safety-related functions or directly protect any safety-related equipment. However, the building is located next to a safety-related mechanical system. The applicant has determined that the cold chemistry laboratory building is within the scope of license renewal because its failure could prevent satisfactory accomplishment of required safety-related functions. The location of the building is shown in Fig. 2.2-1 of the LRA.

2.4.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.2 of the LRA and the USAR to determine whether there is reasonable assurance that the structure and structural components of the cold chemistry laboratory have been properly identified as being within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

The applicant listed the structural components of the cold chemistry laboratory in Table 3.6-4 of the LRA. In the table, the applicant listed the reinforced concrete foundations, walls, and roof as the components requiring an AMR. These components are passive and are considered to be long-lived, unless specific justification is provided to the contrary. In a meeting with the applicant on January 4, 2001, the staff verified the SCs of the cold chemistry laboratory with the applicant and found that the scoping of the structural components was correct. Therefore, there is reasonable assurance that the applicant has appropriately identified the SCs subject to an AMR for the cold chemistry laboratory pursuant to 10 CFR 54.21(a)(1).

2.4.2.2.3 Conclusion

On the basis of this review, the staff concludes that there is reasonable assurance that the applicant has appropriately identified the SCs that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR54.4 and 10 CFR54.21(a)(1), respectively.

2.4.2.3 Control Building

In Section 2.4.2.3, "Control Building," of the LRA, the applicant described the structure of the control building and identified its structural components that are within the scope of license renewal and subject to an AMR. The design of the control building is described in Section 5.3-1 of the USAR. The staff reviewed the information provided by the applicant to determine whether the applicant has adequately demonstrated that the requirements of 10 CFR 54.4 and 10 CFR 54.21 have been met for the control building structure and components.

2.4.2.3.1 Summary of Technical Information in the Application

The control building is a three-story reinforced concrete structure that houses the following:

- reactor control rod drive equipment and 3B/4B motor control centers
- cable spreading room and battery room
- control room
- computer room

The control building is a seismic Category 1 structure and its walls and roof are designed for missile protection. Seismic Category 1 structures are structures which are designed to prevent uncontrolled release of radioactivity and withstand all loading without loss of function. The applicant has determined that the control building structure and its components are within the scope of license renewal because they perform one or more of the following intended functions:

- Provide structural support to safety-related components.
- Provide shelter/protection to safety-related components (including radiation shielding).
- Provide rated-fire barriers to retard spreading of a fire.
- Provide a missile barriers.
- Provide structural support to non-safety-related components whose failure could prevent satisfactory accomplishment of required safety-related functions.
- Provide structural support and shelter to the components relied on during certain events, such as fireS, anticipated transients without scram, and station blackout.

The applicant listed 20 component/commodity groups in Table 3.6-5 of the LRA. These structural components and commodities in the table are subject to an AMR because they perform the applicable intended functions without moving parts or without change in configuration or properties and are not subject to provide replacement based on a qualified life or specified time limit.

2.4.2.3.2 Staff Evaluation

The staff reviewed Section 2.4.2.3 of the LRA and the supporting information in the USAR to determine whether there is reasonable assurance that the structural components and

commodities the control building have been properly identified as being within the scope of license renewal and subject to an AMR.

In Section 2.4.2.3 of the LRA, the applicant did not explain whether the exterior walls and foundation of the control building have expansion joints, water-stops, or epoxy grout for the below-grade construction joints subject to an AMR. In a January 4, 2001 meeting, the applicant clarified that no structural components in the control building are exposed to the groundwater. Water-stops or epoxy grout is not required in the exterior walls or foundation. The structures with concrete components located below groundwater elevation are the intake structure, the discharge structure, and the floors and lower portions of the RHR pump and heat exchanger rooms in the auxiliary building.

Table 3.6-5 of the LRA lists 20 passive structural component and commodity groups that are subject to an AMR. The components and commodities in the table include reinforced concrete beams, columns, walls, floors, and the foundation (above groundwater elevation); masonry walls; control room ceiling and raised floor; weatherproofing roofing material (caulking/sealant); anchorages/embedment; safety-related and non-safety-related components supports; piping, cable tray, and conduit supports; cable trays, conduits, instrument racks and frames; electrical enclosures and supports; HVAC supports; and structural and miscellaneous steels, such as beams, columns, connections, stairs, platforms and gratings, etc. The staff reviewed these component groupings and did not find any omissions of components or commodities subject to an AMR in accordance with 10 CFR 54.21(a). The staff also did not find any other components in the control building that were not included in the AMR table.

2.4.2.3.3 Conclusion

On the basis of this review, the staff concludes that there is reasonable assurance that the applicant has appropriately identified the structural components and commodities that are within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and CFR 54.21(a)(1), respectively.

2.4.2.4 Cooling Water Canals

In Section 2.4.2.4, "Cooling Water Canals," of the LRA, the applicant describes the earthen structure of the cooling water canals and identifies the components of the canals that are within the scope of license renewal. A general description of the cooling water canals is provided in the Environmental Report of the LRA.

2.4.2.4.1 Summary of Technical Information in the Application

The cooling water canals are the earthen structures that provide cooling to the heated discharge water prior to reuse at the intake structure. The canals are a closed recirculating loop that serve as the plant's ultimate heat sink. The site occupies an area approximately 2 miles wide by 5 miles long and includes 168 miles of earthen canals. There are no cooling towers associated with this recirculating heat dissipation system. The canals discharge heated condenser water at one end and withdraw cooled water at the other end for reuse. The discharge canal receives heated effluent from the plant and distributes the flow into 32 feeder canals. Water in the feeder canals flows south and discharges into a single collecting canal that distributes water to six return canals. Water in the return canals flows north to the plant intake. The applicant has determined that the

cooling water canals are within the scope of license renewal because they provide a source of cooling water for plant shutdown.

2.4.2.4.2 Staff Evaluation

The staff reviewed Section 2.4.2.4 and the Environmental Report of the LRA to determine if there is reasonable assurance that the components of the cooling water canals have been properly identified as being within the scope of license renewal and subject to an AMR. After completing its initial review, the staff requested additional information in a letter to the applicant dated February 2, 2001. The applicant responded to the staff's RAI in a letter to the NRC dated March 1, 2001.

In Table 3.6-5 of the LRA, the applicant listed the typical earthen canal as a component subject to an AMR. The structures associated with the earthen canal, such as the intake and discharge structures and the interceptor ditch, are not listed in the table as the components of the canals. The staff asked the applicant to provide justification for the omissions. In its response, the applicant stated that the intake structure is described in detail in Section 2.4.2.11 of the LRA and the discharge structures are described in Section 2.4.2.6 of the LRA. The staff's review found that these components are in-scope and subject to an AMR for the license renewal and are reviewed separately in the cited sections. There is a ditch along the northwest and west sides of the cooling canals called the interceptor ditch. The ditch is used to restrict inland movement of groundwater seeping from the cooling water canals by pumping interceptor ditch water back into the cooling water canals. The interceptor ditch does not perform the intended function of the canals and is not within the scope of license renewal.

The staff has completed its review of Section 2.4.2.4 of the LRA. As a result of this review, the staff did not find any omissions by the applicant. The applicant has properly identified the passive earthen canal subject to an AMR. The earthen canal meets the criteria of 10 CFR 54.21(a)(1) because it is long-lived and performs the intended function without moving parts or without a change in configuration or properties, and is not subject to replacement based on a qualified life or specified time period.

2.4.2.4.3 Conclusion

On the basis of this review, the staff concludes that there is reasonable assurance that the applicant has properly identified the structure associated with the cooling water canals that is within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.2.5 Diesel-Driven Fire Pump Enclosure

In Section 2.4.2.5, "Diesel Driven Fire Pump Enclosure," of the LRA, the applicant described the enclosure structure of the diesel-driven fire pump and identified its structural components that are within the scope of license renewal. The applicant also identified the structural components that are subject to an AMR in Table 3.6-7 of the LRA.

2.4.2.5.1 Summary of Technical Information in the Application

The enclosure serves as a shelter from the external environment for the diesel-driven fire pump. It is a prefabricated steel frame structure with aluminum sidings and is anchor-bolted to a reinforced concrete foundation. Access is provided through the double doors at each end of the building. The building is a non-safety-related structure and is designed in accordance with the South Florida Building Code (below Seismic Category 2). The location of the enclosure is shown in Fig. 2.2-1 of the LRA.

2.4.2.5.2 Staff Evaluation

The staff reviewed Section 2.4.2.5 of the LRA to determine if there is reasonable assurance that the structural components and commodities of the diesel-driven fire pump enclosure have been properly identified as being within the scope of license renewal and subject to an AMR.

The diesel- driven fire pump enclosure is not specifically credited for fire protection. However, the footnote of Table 3.6-1 of the LRA for intended function #10 states that although not credited in the analyses for the events, these components have been conservatively included within the scope of license renewal. The applicant has determined that the enclosure structure is within the scope of license renewal because it provides shelter to the components relied on during certain postulated fire events.

In Table 3.6-7 of the LRA, the applicant listed seven structural components of the enclosure that require an AMR. The structural components in the table include the reinforced concrete foundations and anchorage/embedment (above groundwater elevation), anchorage/embedment (exposed surfaces), manufactured structure (steel frame and aluminum sidings), pipe supports, doors, and louvers. However, there are no design drawings or detailed descriptions for the enclosure in the UFSAR that the staff can use for verification. In a meeting on January 4, 2001, the staff discussed the structure and components with the applicant and found that the scoping of the components was correct. The applicant has properly identified the components and commodities in Table 3.6-7 of the LRA that are subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.2.5.3 Conclusion

On the basis of this review, the staff concludes that there is reasonable assurance that the applicant has appropriately identified the components and commodities of the diesel-driven fire pump enclosure that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a) and 54.21(a)(1), respectively.

2.4.2.6 Discharge Structure

In Section 2.4.2.6, "Discharge Structure," of the LRA, the applicant described the components of the discharge structure that are within the scope of license renewal and subject to an AMR.

2.4.2.6.1 Summary of Technical Information in the Application

The discharge structure is located along the west edge of the plant secured area. The function of the discharge structure is to collect and provide for the emission of effluents from circulating water, intake cooling water, screen wash, and storm drains into the cooling water canals.

The Unit 3 discharge structure includes a concrete seal well, north concrete headwall, south concrete headwall, and associated steel framing and platforms. The seal well introduces circulating water into the cooling water canals via underground piping. The north headwall introduces flow from the safety-related intake cooling water pipe (from the CCW heat exchangers) and the nonsafety-related screen refuse and storm drain pipes. The south headwall introduces flow from the nonsafety-related intake cooling water pipe (from the turbine plant cooling water heat exchangers) into the cooling water canals.

The Unit 4 discharge structure includes a concrete seal well and a south headwall. The seal well introduces flow from the buried circulating water piping into the cooling water canals. The south headwall introduces flow from both the safety-related and non-safety-related intake cooling water piping as well as the storm drain pipes. No north headwall is required because the screen refuse pipe is common to both units and is part of the Unit 3 discharge structure.

The applicant described the process for identifying the SCs within the scope of license renewal in LRA Section 2.1.2.2, "Civil Structures." Using the methodology described in Section 2.1.2 of the LRA, the applicant compiled a list of component/commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The applicant listed these components/groups in Table 3.6-8 of the LRA. The applicant identified the two reinforced concrete headwalls that contain the safety-related intake cooling water piping from Unit 3 and Unit 4 as being subject to an AMR. The intended function of these components is to provide structural support for the safety-related piping.

2.4.2.6.2 Staff Evaluation

The staff reviewed Section 2.4.2.6 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the discharge structure components and supporting structures within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text submitted by the licensee in Section 2.4.2.6 of the LRA to identify if there were portions of the discharge structure that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those portions of the discharge structure that perform an intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.4.2.6 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the discharge structure that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff found no omissions by the applicant. Therefore, there is reasonable assurance that the applicant adequately identified all portions of the electrical penetration rooms that fall within the scope of license renewal in accordance with 10 CFR
Part 54.4.

The staff determined whether the applicant had properly identified the SCs subject to AMR from among those identified as within scope of license renewal. The applicant identified and listed the SCs subject to AMR for the discharge structure in Table 3.6-8 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling SCs that were within the scope of license renewal but not subject to AMR to verify that these SCs performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

The staff review of the discharge structure included the circulating water system, the intake cooling water system and the storm water and cooling canal, and determined that only the north pipe headwall and the south pipe headwall performed an intended function by providing structural support for the intake cooling water piping that discharges water from the CCW heat exchangers.

2.4.2.6.3 Conclusions

On the basis of the staff's review of the information contained in Section 2.4.2.6 of the application, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the discharge structure that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.4.2.7 Electrical Penetration Rooms

In Section 2.4.2.7, "Electrical Penetration Rooms," of the LRA, the applicant described the components of the electrical penetration rooms that are within the scope of license renewal and subject to an AMR. The rooms are further described in Section 5E-2.2 of the Turkey Point Updated Final Safety Analysis Report (UFSAR).

2.4.2.7.1 Summary of Technical Information in the Application

The function of the electrical penetration rooms is to provide shelter and protection for safety-related SCs (containment electrical penetrations and cables). The rooms also provide structural support for nonsafety-related components to preclude interaction with safety-related components in the rooms.

Each unit has two electrical penetration rooms. Unit 3 has a West and South room, and Unit 4 has a West and North room. All four rooms are constructed of reinforced concrete. The North and South rooms are integral with the auxiliary building and the West rooms are independent structures located immediately west of each containment building.

The applicant described the process for identifying the SCs within the scope of license renewal in LRA Section 2.1.2.2, "Civil Structures." Using the methodology described in Section 2.1.2 of the LRA, the applicant compiled a list of component/commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The applicant listed these components/groups in Table 3.6-9 of the LRA. The applicant identified nine component/ commodity groups as subject to an AMR: steel anchorages/embedments, cable trays and conduits (and their supports), electrical enclosures, electrical component supports, instrument

racks, structural steel, ladders/platforms, and weatherproofing. The intended functions of these components include: structural support for safety-related and non-safety related components, shelter/protection, fire barrier, missile barrier, and structural support/shelter to components required for fire protection, ATWS, and SBO.

2.4.2.7.2 Staff Evaluation

The staff reviewed Section 2.4.2.7 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the electrical penetration room components and supporting structures within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text submitted by the licensee in Section 2.4.2.7 of the LRA and the Turkey Point UFSAR to identify if there were portions of the structures that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those portions of the electrical penetration rooms that perform at least one intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.4.2.7 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the electrical penetration rooms that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff found no omissions by the applicant. Therefore, there is reasonable assurance that the applicant adequately identified all portions of the electrical penetration rooms that fall within the scope of license renewal in accordance with 10 CFR Part 54.4.

The staff determined whether the applicant had properly identified the SCs subject to AMR from among those identified as within the scope of license renewal. The applicant identified and listed the SCs subject to an AMR for the electrical penetration rooms in Table 3.6-9 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling SCs that were within the scope of license renewal but not subject to AMR to verify that these SCs performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

During a December 21, 2000 conference call, the staff asked the applicant to clarify whether the safety-related and nonsafety-related components in the electrical penetration rooms that could prevent the accomplishment of safety-related functions were considered in scope. The applicant clarified that there are safety-related instrument racks, electrical enclosures, cable trays, and conduits located in the rooms. The failure of nonsafety-related components, such as ladders, platforms, or supports could affect the safety-related components in the rooms, and were included in the scope of license renewal and are subject to an AMR.

2.4.2.7.3 Conclusions

On the basis of the staff's review of the information contained in Section 2.4.2.7 of the application and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by

the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the electrical penetration rooms that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.4.2.8 Emergency Diesel Generator Buildings

The original on-site emergency AC power source for Turkey Point Units 3 and 4 consisted of two EDGs housed in a building adjacent to Unit 3. In 1990-1991, two additional EDGs were installed. The new EDGs were installed in the new Unit 4 EDG building and designated 4A and 4B, while the two original EDG's housed in the Unit 3 EDG building were designated 3A and 3B. The function of the two reinforced concrete EDG buildings is to house and protect the EDGs and their support systems. The first floor of each building is divided into two bays, with each bay containing one of the two engine-generator sets. The buildings also house the fuel oil, starting air, lubricating oil, combustion air, and exhaust air equipment.

The components and arrangement of components are different in the two EDG buildings, with the most notable difference in the fuel oil systems. The Unit 3 system uses an outdoor storage tank (3T36) with two day tanks (3T23A and 3T23B) located in elevated tank rooms above each EDG set, and a smaller skid tank adjacent to each of the two EDG sets. The Unit 4 EDG system uses two underground concrete encased fuel oil storage tanks (4T259A and 4T259B) located beneath the Unit 4 EDG building with a small tank (4T260A and 4T260B) located adjacent to each EDG set.

2.4.2.8.1 Summary of Technical Information in the Application

In the LRA, Section 2.4.2.8, "Emergency Diesel Generator Buildings," the applicant described the components of the EDG buildings that are within the scope of license renewal and subject to an AMR. These buildings are further described in Sections 5.3.2 (Unit 3) and 5.3.4 (Unit 4) of the Turkey Point UFSAR.

The applicant described the process for identifying the structural components within the scope of license renewal in LRA Section 2.1.2.2, "Civil Structures." Using the methodology described in LRA Section 2.1.2, the applicant compiled a list of structural component/commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The applicant listed the EDG building components/groups in Table 3.6-10 of the LRA. The applicant identified twelve component/commodity groups as subject to an AMR: structural steel, stairs/platforms/ grating, anchorages/embedments, pipe and component supports, cable tray and conduit, electrical component supports, electrical enclosures, instrument racks and frames, HVAC supports, unreinforced masonry walls, and weatherproofing.

The intended functions of these components include structural support to safety-related and nonsafety-related components, shelter/protection to safety-related components, fire barrier, missile barrier, flood protection barrier, and structural support/shelter for components required for fire protection, ATWS, and station blackout (SBO).

2.4.2.8.2 Staff Evaluation

The staff reviewed Section 2.4.2.8 of the LRA and the Turkey Point UFSAR to determine whether there is reasonable assurance that the applicant appropriately identified the EDG building components and supporting structures within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text and diagrams submitted by the licensee in Section 2.4.2.8 of the LRA and the Turkey Point UFSAR to identify if there were portions of the building structures that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those portions of the EDG buildings that perform at least one intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.4.2.8 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the EDG buildings that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional system functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail in the staff's review of LRA Section 2.3.3.15 of this SER, the staff questioned the omission of the alternate fuel oil fill lines for the Unit 3 EDG from the scope of license renewal. The Unit 4 EDG's are not affected because their underground storage tanks are missile protected. Thus, the Unit 4 EDG's are assured of adequate fuel oil for 7 days of operation.

The staff determined whether the applicant had properly identified the SCs subject to AMR from among those identified as within scope of license renewal. The applicant identified and listed the structural components subject to AMR for the EDG buildings in Table 3.6-10 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling structural components that were within the scope of license renewal but not subject to AMR to verify that these structural components performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

On the basis of this review, the staff found that the applicant properly identified the EDG building structural components subject to an AMR. The applicant's response to RAI 2.4.2.8-1 indicated that the valves, piping, and fittings associated with both of the Unit 3 EDG day tank alternate fill lines were included in the AMR for Section 3.4 of the LRA, "Emergency Diesel Generators and Support Systems."

2.4.2.8.3 Conclusion

On the basis of the review of Section 2.4.2.8 of the LRA, and Sections 5.3.2 and 5.3.11 of the UFSAR, the NRC staff has determined that there is reasonable assurance that the applicant adequately identified those portions of the EDG buildings that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.2.9 Fire Protection Monitoring Station

In Section 2.4.2.9 of the LRA, "Fire Protection Monitoring Station," the applicant described the components of the fire protection monitoring station that are within the scope of license renewal and subject to an AMR. Although it is not specifically credited for fire protection, the applicant conservatively included the fire protection monitoring station in the scope of license renewal.

2.4.2.9.1 Summary of Technical Information in the Application

The fire protection monitoring station is a concrete block structure located adjacent to the west wall of the control building. It contains numerous video screens used to monitor various areas of the plant as a compensatory measure pending resolution of corrective actions related to the application of Thermo-lag fire retardant.

The applicant described the process for identifying the SCs within the scope of license renewal in LRA Section 2.1.2.2, "Civil Structures." Using the methodology described in Section 2.1.2 of the LRA, the applicant compiled a list of component/commodity groupings within the license renewal boundaries that are subject to an AMR and identified their intended functions. The applicant listed these components/groups for the fire protection monitoring station in Table 3.6-11 of the LRA. The applicant identified seven component/commodity groups as subject to an AMR: structural steel roof support, steel anchorages/embedments (exposed), steel anchorages/ embedments (above groundwater elevation), reinforced concrete floor and roof, unreinforced masonry block walls, aluminum doors, and a membrane roof. The intended function of these components is to provide structural support and shelter/protection to components required for fire protection.

2.4.2.9.2 Staff Evaluation

The staff reviewed Section 2.4.2.9 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the fire protection monitoring station components and supporting structures within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text submitted by the licensee in Section 2.4.2.9 of the LRA and the Turkey Point UFSAR to identify if there were portions of the structures that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those portions of the fire protection monitoring station that perform at least one intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.4.2.7 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the fire protection monitoring stations that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff found no omissions by the applicant. Therefore, there is reasonable assurance that the applicant adequately identified all portions of the fire protection monitoring stations that fall within the scope of license renewal in accordance with 10 CFR Part 54.4.

The staff determined whether the applicant had properly identified the SCs subject to AMR from among those identified as within the scope of license renewal. The applicant identified and listed the SCs subject to AMR for the fire protection monitoring station in Table 3.6-11 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling SCs that were within the scope of license renewal but not subject to AMR to verify that these SCs performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

During a conference call on December 21, 2000, the staff questioned the applicant about the membrane roof of the fire protection monitoring station. Although the roof was included within the scope of the license renewal application, the applicant determined that no aging management activities were required. The applicant explained that the roof of the fire protection monitoring station was protected from sun and weather by an overhang from the control building and would not be exposed to normal weathering effects. In addition, the station is manned around the clock so that any leak in the roof would be identified in a timely manner. Finally, the applicant explained that the fire protection monitoring station was only included in the scope of license renewal because corrective actions concerning Thermo-lag fire retardant insulation were not yet completed at the time that the LRA was submitted. The applicant plans on removing the fire protection monitoring station from the LRA once the Thermo-lag corrective actions are complete (scheduled for December 31, 2001). The staff reviewed the applicant's response to the question concerning the membrane roof and fire protection monitoring station and found the applicant's justification acceptable.

2.4.2.9.3 Conclusions

On the basis of the staff's review of the information contained in Section 2.4.2.9 of the application, the clarifications provided in the December 21, 2000 conference call, and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those portions of the fire protection monitoring station that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.4.2.10 Fire Rated Assemblies

In the LRA Section 2.4.2.9, "Fire Rated Assemblies," the applicant described the fire rated components that are within the scope of license renewal and subject to an AMR.

2.4.2.10.1 Summary of Technical Information in the Application

Fire rated assemblies include fire barriers, fire doors, fire dampers, penetration seals, and electrical conduit seals. These components are described in UFSAR Appendix 9.6A, Sections 3.11-3.15. Fire dampers are reviewed under LRA Section 2.3.3.14, and will not be included in this section.

Fire barriers limit the spread of fire by compartmentalization and containment, to ensure that one set of redundant safety-related equipment remains free of fire damage so that it is available to

shut down the reactor and maintain it in a shutdown condition. Fire barriers include walls, floors, ceilings, raceway protection, structural steel fireproofing, Thermo-lag barriers, manhole covers, and hatches, and radiant energy shields. Concrete walls, floors, and ceilings were evaluated as part of the structures with which they are associated. Manhole covers were evaluated as part of the yard structures. Radiant energy shields (inside containment) were evaluated with the containment structures.

Fire door assemblies (door, frame, lockset, etc) prevent the spread of fire through passageways and fire barriers.

Penetration seals maintain the integrity of fire barriers at barrier penetrations. Penetrations, may be restored with grout or concrete, or they may be sealed using solid silicone elastomers, boot seals, high-density self-supporting gel seals, prefabricated fire seals, or hydrosil material seals.

Electrical conduit seals limit flame propagation, protect open-ended conduit from fixed water suppression spray, and keep Halon from escaping an area protected by a Halon suppression system.

2.4.2.10.2 Staff Evaluation

The staff reviewed Section 2.4.2.10 of the LRA to determine whether there is reasonable assurance that the applicant appropriately identified the fire rated assemblies within the scope of license renewal in accordance with 10 CFR 54.4 and subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff reviewed the text submitted by the licensee in Section 2.4.2.10 of the LRA and the Turkey Point UFSAR to identify if there were assemblies that the applicant did not identify as within the scope of license renewal that performed intended functions. Only those fire rated assemblies that perform at least one intended function are included within the scope of license renewal and are identified as such by the licensee in Section 2.4.2.7 of the LRA. For scoping systems and structures, the staff focused their review on those SCs of the fire rated assemblies that were not identified as being within the scope of license renewal to verify that they do not have any intended functions that meet the scoping requirements of 10 CFR 54.4. The staff also reviewed the UFSAR to determine if there were any additional functions that were not identified as intended functions in the LRA and verified that those additional functions did not meet the scoping requirements of 10 CFR 54.4. As described in detail below, the staff found no omissions by the applicant. Therefore, there is reasonable assurance that the applicant adequately identified all fire rated assemblies that fall within the scope of license renewal in accordance with 10 CFR Part 54.4.

The staff determined whether the applicant had properly identified the SCs subject to AMR from among those identified as within scope of license renewal. The applicant identified and listed the SCs subject to AMR for the fire rated assemblies in Table 3.6-11 of the LRA using the screening methodology described in Section 2.1 of the LRA. The staff evaluated the scoping and screening methodology and documented their findings in Section 2.1 of this SER. As described in more detail below, the staff performed the review by sampling SCs that were within the scope of license renewal but not subject to AMR to verify that these SCs performed their intended functions with moving parts or a configuration change or were subject to replacement on the basis of a qualified life or specified time period (i.e., active or short-lived).

2.4.2.10.3 Conclusions

On the basis of the staff's review of the information contained in Section 2.4.2.10 of the application, and the supporting information in the Turkey Point UFSAR, the staff did not find any omissions by the applicant and, therefore, concludes that there is reasonable assurance that the applicant adequately identified those fire rated assemblies that fall within the scope of license renewal and are subject to an AMR, in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

2.4.2.11 Intake Structure

In LRA Section 2.4.2.11, "Intake Structure," the applicant describes the intake structure and identifies the structural components of the intake structure that are within the scope of license renewal and subject to an AMR. The staff reviewed Section 2.4.2.11 to determine if there is reasonable assurance that the applicant has identified and listed the structural components of the intake structure that are subject to an AMR. The design of the intake structure is described in Section 5.3.2 of the Turkey Point Unit 3 and 4 UFSAR. The general location of the intake structure is identified in Figure 2.2-1 of the LRA.

2.4.2.11.1 Summary of Technical Information in the Application

Cooling water and circulating water are provided to Turkey Point Units 3 and 4 by the intake structure at the west end of the intake canal. The intake canal is located east of the plant proper along the shore of Biscayne Bay. The intake structure is designed to Seismic Category 1 requirements. It is also designed to withstand the impacts of all internally and externally generated missiles. It is also designed for protection against the effects of an external flood. One integrally constructed intake structure services both Units 3 and 4. It is constructed primarily of reinforced concrete and steel. There are eight intake channels. A portion of the intake structure area is above grade elevation, and a portion of it below grade and exposed to groundwater, saltwater flow, and saltwater splash.

The intake structure houses and supports the intake cooling water system, including its piping, pumps and motors, and the circulating water and screen wash pumps and motors. The pumps suction water from the intake channels and supply it to Units 3 and 4. Each intake channel is equipped with a stationary screen and a traveling screen. The stationary screens filter large debris to avoid damage to the traveling screens, while the traveling screens prevent debris from damaging the pumps. At the outermost end of the intake canal is a steel grating that prevents debris from entering the intake canal.

The applicant describes its methodology for identifying the structural components within the scope of license renewal in Section 2.1.1 of the LRA. Based on its scoping methodology, the applicant, in Section 2.2, Table 2.2-2, of the LRA, identifies the intake structure as being within scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.11 of the LRA.

The intake structure and its structural components meet the intent of 10 CFR 54.4(a)(1) for license renewal because they perform one or more of the following functions:

- Provide structural support to safety-related components.

- Provide shelter/protection to safety-related components (including radiation shielding).
- Provide a source of cooling water for plant shutdown.
- Provide structural support to non-safety-related components whose failure could prevent satisfactory accomplishment of any of the required safety-related functions.
- Provide flood protection barriers.
- Provide structural support and/or shelter/protection to components required for fire protection, anticipated transients without scram (ATWS) and/or SBO events.

On the basis of the above-described methodology, the applicant has identified both the structural components and the commodity groups of the intake structure, and identified their intended functions that are subject to an AMR in Table 3.6-13 in the LRA. The applicant has determined that the intake structure is within the scope of 10 CFR 54.4(a)(1) and 10 CFR 54.21(a)(1).

2.4.2.11 Staff Evaluation

The NRC staff reviewed Section 2.4.2.11 of the LRA and the Turkey Point Unit 3 and 4 UFSAR to determine if the applicant has adequately implemented its methodologies so that there is reasonable assurance that the structural components and commodities of the intake structure have been properly identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a)(1) and 10 CFR 54.21(a)(1).

The intake structure consists of various SCs and commodities that support the SSCs that are within the scope of license renewal. The applicant listed the SCs and commodities that are subject to an AMR in Table 3.6-13 of the LRA. In the table, the applicant identified the structural components and commodities common to the intake structure in three material groups: carbon steel (structural beams and columns, anchorages/embedments), carbon steel-galvanized (stairs, platforms, gratings, cable trays, conduits and supports, and electrical enclosures and supports); stainless steel (seismic anchors non-safety-related pipe segments, and the intake traveling screens), and concrete (embedments, and reinforcement).

The staff did not find any omissions in the SCs of the intake structure identified by the applicant as being subject to an AMR in accordance with 10 CFR 54.21(a).

2.4.2.11.3 Conclusion

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has appropriately identified the SCs of the intake structure that are within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 54.21(a)(1), respectively.

2.4.2.12 Main Steam and Feedwater Platforms

In LRA Section 2.4.2.12, "Main Steam and Feedwater Platforms," the applicant describes the structural components of the main steam and feedwater platforms that are within the scope of

license renewal and subject to an AMR. The general location of the main steam and feedwater platforms is identified in Figure 2.2-1 of the LRA.

2.4.2.12.1 Summary of Technical Information in the Application

There are two main steam and feedwater platforms, one for each plant unit. They are located directly west outside of the Unit 3 and 4 containment buildings. The main steam and feedwater platforms are designed to Seismic Category I criteria and provide support primarily to piping and mechanical components of the main steam system, the feedwater system, and the auxiliary feedwater system. These systems consist of Class I structures and equipment that are supported by the main steam and feedwater platforms.

The applicant describes its methodology for identifying the structural components within the scope of license renewal in Section 2.1, "Plant Level Scoping." Based on its scoping methodology, the applicant, in Section 2.2, Table 2.2-2 in the LRA, identifies the main steam and feedwater platforms as being within scope of license renewal and describes the results of its scoping methodology in Section 2.2.12, of the LRA. The applicant states that the main steam and feedwater platforms are within the scope of license renewal because they do the following:

- provide support and protection for safety-related components that are relied upon during and following certain design basis events;
- provide support for non-safety-related SCs whose failure could prevent satisfactory accomplishment of the required safety-related functions;
- provide support to SCs that are relied upon during certain postulated fires, anticipated transients without scram and station blackout events; and
- provide protection to SCs from missiles, pipe whip restraints, and jet impingements.

On the basis of the above described methodology, the applicant, in relation to 10 CFR 54.4 (a)(2), identifies both the structural components and the commodity groups that make up the main steam and feedwater platforms and identifies the intended functions of each structural component and commodity group in Table 3.6-14 of the LRA. Figure 2.2-1 of the LRA shows the general layout of the Turkey Point Unit 3 and 4 main steam and feedwater platforms.

2.4.2.12.2 Staff Evaluation

The staff reviewed Section 2.4.2.12 in the LRA to determine if there is reasonable assurance that the applicant has identified the main steam and feedwater platforms and adequately identified the structural components of the platforms that are subject to an AMR in accordance with 10 CFR 54.4(a)(2), and 10 CFR 54.21(a)(1), respectively. The staff also reviewed Figure 2.2-1 and Table 3.6-14 to identify any structural components that may have been omitted from the scope of license renewal. In the table, the applicant identified the structural components of the main feedwater platform as structural steel beams, columns, steel connections, stairs, platforms, gratings, anchorages/embedments, safety-and non-safety-related pipe supports, pipe whip restraints, cable tray conduits and supports, instrument racks and frames, and above-and below-grade reinforced concrete foundations. These component/commodity groups of the main steam

and feedwater platforms are described in four material groups: carbon steel, carbon steel-galvanized, steel, and reinforced concrete.

The staff did not find any omissions in of the main steam and feedwater platform SCs as identified by the applicant as being subject to an AMR in accordance with 10 CFR 54.21(a).

2.4.2.12.3 Conclusion

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has appropriately identified the SCs of the main steam feedwater platforms that are within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 54.21(a)(1), respectively.

2.4.2.13 Plant Vent Stack

In LRA Section 2.4.2.13, "Plant Vent Stack," the applicant describes the structural components of the plant vent stack that are within the scope of license renewal and subject to an AMR.

2.4.2.13.1 Summary of Technical Information in the Application

The plant vent stack is a steel tubular structure that provides a means of releasing plant processed gases to the atmosphere. It is located in the auxiliary building and protrudes through the roof of the auxiliary building adjacent to the Unit 4 containment. It is supported at the base by the auxiliary building and laterally restrained at its top to the Unit 4 containment structure.

The methodology for identifying the structural components that are within the scope of license renewal is described in Section 2.1, "Plant Level Scoping." Based on the scoping methodology, the applicant, in Section 2.2, Table 2.2-2, of the LRA, identifies the plant vent stack as being within scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.13 in the LRA. Further, Figure 2.2-1 of the LRA shows the general layout of the location of the plant vent stack. The applicant states that the plant vent stack is within the scope of license renewal because it is a non-safety-related structure whose failure could prevent satisfactory accomplishment of the required safety-related functions.

On the basis of the above-described methodology, the applicant, in accordance with 10 CFR 54.4 (a)(2), identifies both the structural components and the commodity groups that make up the plant vent stack and identifies the intended functions of each structural component and commodity group in Table 3.6-15 of the LRA.

2.4.2.13.2 Staff Evaluation

The NRC staff reviewed Section 2.4.2.13 of the LRA to determine if there is reasonable assurance that the applicant has identified the main steam and feedwater platforms and adequately identified the structural components of the plant vent stack that are subject to an AMR in accordance with 10 CFR 54.4(a)(2) and 10 CFR 54.21(a)(1), respectively. The staff also reviewed the UFSAR and Table 3.6-15 to determine if there are any structural components that may have been omitted from the scope of license renewal. In the table, the applicant identified the structural components as a steel vent stack, structural steel supports and restraints, conduits and conduit supports, electrical enclosures, and anchorages/embedments. These SCs and

commodities common to the plant vent stack are identified under three material groups: carbon steel, carbon steel-galvanized, and concrete.

The staff did not find any omissions in the SCs identified by the applicant as being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.4.2.13.3 Conclusion

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has adequately identified the SCs of the plant vent stack that are within the scope of license renewal and subject to an AMR, in accordance with the requirements of 10 CFR 54.4(a) and 54.21(a)(1), respectively.

2.4.2.14 Spent Fuel Storage and Handling

In LRA Section 2.4.2.14, "Spent Fuel Storage and Handling," the applicant describes all the equipment and structural components that are involved in the handling and storage of spent fuel and are within the scope of license renewal and subject to an AMR. Spent fuel storage and handling is further described in Sections 5.2.4 and 9.5 in the Turkey Point Unit 3 and 4 UFSAR.

2.4.2.14.1 Summary of Technical Information in the Application

Spent fuel storage and handling includes all the equipment and structural components that are necessary to remove spent fuel from its location, transport it, and place it in storage. The fuel handling system consists basically of the refueling cavity, the spent fuel pit, and the fuel transfer system. Specifically, spent fuel storage and handling includes all equipment and tools needed to remove spent fuel from the reactor vessels, transport it to the SFPs, place it in the storage racks, and remove it from the pools to alternative storage facilities.

The refueling cavity is not addressed in this section of the LRA. The spent fuel storage facilities include the spent fuel pit, spent fuel pit liners, key gates, and the spent fuel storage racks, spent fuel pit pumps, motor, and heat exchanger. As stated previously in this SER, the spent fuel pit is addressed under Section 2.4.2.1, "Auxiliary Building." The auxiliary building houses the fuel handling area (the SFP and the concrete sliding doors).

The equipment and tools used for spent fuel handling include the reactor cavity seal rings, the manipulator cranes, the fuel transfer system (including the refueling canal inside containment and the fuel transfer canal inside the spent fuel building), the fuel transfer tubes, the penetration sleeves, the gate valves, the spent fuel bridge cranes, the fuel handling tools, and the overhead spent fuel cask crane.

The methodology for identifying the structural components that are within the scope of license renewal is described in Section 2.1, "Plant Level Scoping." Based on the scoping methodology, the applicant, in Section 2.2, Table 2.2-2, of the LRA, identifies the spent fuel storage and handling system as being within scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.14 in the LRA. The applicant states that the fuel storage and handling facilities and equipment are within the scope of license renewal because they perform the following functions:

- Provide a pressure boundary.
- House and provide shelter/protection and structural support for safety-related systems.
- Provide fire rated barriers to retard the spreading of a fire.
- Provide missile barriers.

Various components of the spent fuel handling system such as the spent fuel bridge cranes, the fuel handling tools,and the overhead spent fuel cask crane are non-safety- related components whose failure could prevent satisfactory accomplishment of required safety-related functions.

On the basis of the above- described methodology, the applicant, in accordance with 10 CFR 54.4, identifies in Table 3.6-16 of the LRA, the components, equipment and tools, and the commodity groups that make up the spent fuel storage and handling systems and identifies the intended functions of each component, piece of equipment and tool, and commodity group.

2.4.2.14.2 Staff Evaluation

The staff reviewed Section 2.4.2.14 of the LRA and the supporting information in Sections 5.2.4 and 9.5 of the Turkey Point Unit 3 and 4 UFSAR to determine whether there is reasonable assurance that the SCs and commodities in spent fuel storage and handling operations have been adequately identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a)(2) and 10 CFR 54.21(a)(1).

The staff reviewed the component/commodity groups in Table 3.6-14 (manipulator cranes, spent fuel bridge cranes, spent fuel cask crane, fuel transfer sheave frames, spent fuel pit (pools), transfer canals and refueling pool liners, fuel transfer tubes, spent fuel handling equipment and tools, reactor cavity seal rings, spent fuel storage racks, reinforced concrete overhead sliding doors, Boraflex, etc.,) to determine if there were any other components involved in spent fuel storage and handling that meet the scoping criteria of 10 CFR 54.4 but were not included within the scope of license renewal.

The staff has reviewed Section 2.4.2.14 of the LRA and the Turkey Point Unit 3 and 4 UFSAR. The staff also examined the components and equipment and tools listed in Table 3.6-16 of the LRA to determine if there are SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). On the basis of the above review the staff did not identify any omissions by the applicant.

2.4.2.14.3 Conclusion

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has adequately identified the structures and structural components of the spent fuel storage and handling that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 54.21(a)(1), respectively.

2.4.2.15 Turbine Building

In Section 2.4.2.15, "Turbine Building," of the LRA, the applicant describes the structural components of the turbine building that are within the scope of license renewal and subject to an AMR. The turbine building is further described in various sections in the Turkey Point UFSAR.

2.4.2.15.1 Summary of Technical Information in the Application

In the LRA, in Figure 2.2-1, "Turkey Point Plant Structures," the applicant depicts the general location of the turbine building. The turbine building is located adjacent to and east of the control building and is flanked on its northwest and southwest corners by the Unit 3 and 4 containment structures, respectively. The function of the turbine building is to house the Unit 3 and 4 safety-related equipment and structures, including but limited to: the 4160V switchgear; the 480V load centers and associated concrete enclosures; the feedwater pump discharge valves and associated blockwall enclosures; the turbine generators and drivers, and the EDG 3A and 4A motor control centers and associated steel enclosures. Additional safety-related equipment housed in the turbine building includes, but is not limited to, miscellaneous safety-related equipment such as the auxiliary feedwater supply lines from the condensate storage tanks and numerous conduits and cable trays.

The turbine building also houses a number of non-safety-related systems and associated structures that are relied upon to support the intended functions of safety-related structures, systems, and components (SSCs). It is designed and constructed on a foundation mat with concrete bearing walls and slabs and is built partially below grade. The construction joints of the exterior concrete wall contain a water-proofing membrane with concrete topping below the plant's design groundwater elevation.

Although the turbine building houses some safety-related systems, the turbine building structure and structural components are not designed and constructed to seismic Category I requirements. As stated in the UFSAR, Section 5A.1.2. Seismic Category 1 structures are designed to prevent uncontrolled release of radioactivity, and to withstand all applicable loads, including but not limited to system and seismic loadings without loss of function. Accordingly, the turbine building is not designed to seismic Category 1 requirements. The applicant listed the passive and long-lived components and commodities unique to the turbine building in Table 3.6-17. The applicant also determined that some areas in the turbine building (i.e., areas that serve as fire barriers) meet the scoping requirements of 10 CFR 54.4(a)(3) in that these components are relied upon in plant evaluation to perform functions compliant with 10 CFR 50.48. The fire barriers (i.e. fire retardant coatings, fireproofing, and fire doors) are grouped as fire-rated assemblies in Table 3.6-12, while fire walls and slabs are grouped as reinforced concrete components in Table 3.6.3. Fire barriers are addressed under Section 2.4.2.10 in this SER.

The applicant describes its methodology for identifying the structural components within the scope of license renewal in Section 2.1.1 of the LRA. Based on its scoping methodology, the applicant, in Section 2.2, Table 2.2-2 in the LRA, identifies the turbine building as being within scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.15 in the LRA.

The turbine building and its structural components meet the intent of 10 CFR 54.4(a)(1) for license renewal because they perform one or more of the following functions:

- houses and provides structural support to safety-related components;
- provides shelter/protection of safety-related components (including radiation shielding);
- provides rated fire barriers to retard spreading of a fire;
- provides missile barriers;
- provides structural support to non-safety-related components whose failure could prevent satisfactory accomplishment of required safety-related functions;
- provides flood protection barriers; and
- provides structural support and/or shelter/protection to components required for fire protection, anticipated transients without scram (ATWS) and/or Station Blackout events. On the basis of the above described methodology, the applicant identifies both the structural components and the commodity groups that makeup the turbine building and identifies the intended functions the SCs and commodity groups that are subject to an AMR in Table 3.6-3 in the LRA. Some of the structural components in the turbine building are common to many other buildings, however, they are uniquely identified as a commodity group item in Table 3.6-17 of the LRA. The commodity group is addressed by the applicant in Section 2.4.6.2 of the LRA. As stated by the applicant, the SCs and commodities in the turbine building are subject to an AMR because they perform their intended function(s) without moving parts or without change in configuration or properties, and are not subject to periodic replacement based on qualified life or specified time limit.

2.4.2.15.2 Staff Evaluation

The NRC staff reviewed Section 2.4.2.15 of the LRA and the supporting information in various sections in the Turkey Point Units 3 and 4 UFSAR to determine whether there is reasonable assurance that the SCs and commodities of the turbine building have been adequately identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff reviewed the structural component/commodity groupings in Table 3.6-17 (i.e. reinforced concrete foundations and walls; reinforced concrete foundation beams, columns, walls, floors/slabs; miscellaneous steel-stairs, platforms, gratings, etc.) to determine if there were any other components in the turbine building that meet the scoping criteria of 10 CFR 54.4(a) but was not included within the scope of license renewal.

As a result of this review, the staff requested clarifying information regarding the turbine building and its structural components that serve as fire barriers. The applicant addressed the staff's concerns in a meeting on January 24, 2001. The applicant stated that the fire barriers and doors are not listed in Table 3.6-17 in the LRA as a commodity of the turbine building. Only the concrete structural components that serve as fire barriers are included in the commodity group in the turbine building. The fire barriers and doors which are needed to protect safety-related SSCs by providing a rated fire barrier to confine a fire from spreading to adjacent areas of the plant are

listed in Table 3.6-12, "Fire Rated Assemblies," in the LRA. Staff evaluation of the fire rated assemblies is provided under Section 2.4.2.10 in this SER.

The staff has reviewed Section 2.4.2.15 of the LRA and the Turkey Point Units 3 and 4 UFSAR. The staff also examined the components and commodities listed in Tables 3.6-17 in the LRA to determine if they are the SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). On the basis of the above review the staff did not identify any omissions by the applicant.

2.4.2.15.3 Conclusions

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has appropriately identified the structural components of the turbine building that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.2.16 Turbine Gantry Cranes

In Section 2.4.2.16, "Turbine Gantry Cranes," of the LRA, the applicant describes the structural components of the turbine gantry crane system that are within the scope of license renewal and subject to an AMR. The turbine gantry cranes are further described in Appendix 5I.3, "Heavy Load Handling System," of the Turkey Point UFSAR.

2.4.2.16.1 Summary of Technical Information in the Application

As stated in the UFSAR Appendix 5I, the heavy load handling systems have been identified and classified into two groups: (1) Group I which includes handling systems that need to conform to guidelines in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," because a load drop from these systems could result in damage to irradiated fuel or systems required for plant shutdown or decay heat removal; and, (2) Group II which includes handling systems (excluded from Group I) that do not need to conform to the guidelines in NUREG-0612 because a load drop from these systems will impact at points that are sufficiently separated from safety-related components so as not to result in any significant impact to plant operations and safety.

The turbine gantry cranes are classified as Group I overhead handling systems. There are two turbine gantry cranes: one for Units 1 and 2 and the other for Units 3 and 4. The two cranes share rails that are common to all four units and are used for lifting heavy loads exclusively for Units 1 and 2 and 3 and 4, respectively. A heavy load is a load whose weight is greater than the combined weight of a spent fuel assembly and its handling tool. Turkey Point defines a heavy load as 1760 lbs., however, Turkey Point uses 2000 lbs. which includes the weight of the control element assembly used for lifting spent fuel assemblies in the SFP area only. The Units 1 and 2 crane has a rated capacity of 70/15 tons (70 tons in the main hook and 15 tons in the auxiliary hook). The Units 3 and 4 crane has a rated capacity of 145/35 tons. As stated in the UFSAR Appendix 5I.3.7, the cranes satisfy Guideline 7 in NUREG-0612, Section 5.1.1, and therefore, complies with the Crane Manufacturers Association of America (CMAA) Specification 70 and Chapter 2-1 in ANSI B30.2-1976, "Overhead and Gantry Cranes." Safe load paths and other controls required for use of the turbine gantry cranes are included in administrative procedures that govern the heavy load handling operations.

The applicant has determined that the turbine gantry cranes are load handling systems that meet the intent of 10 CFR 54.4(a)(1)(iii) and 10 CFR 54.4(a)(2) for license renewal. The applicant listed the passive and long-lived components and commodities unique to the turbine gantry cranes in Table 3.6-18.

The applicant describes its methodology for identifying the SCs within the scope of license renewal in Section 2.1.1 of the LRA. Based on its scoping methodology, the applicant, in Section 2.2, Table 2.2-2 in the LRA, identifies the turbine gantry cranes as being within scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.16 in the LRA.

The turbine gantry cranes and their associated components meet the intent of 10 CFR 54.4(a)(1) and (a)(2) for license renewal because they perform the following function:

- provides structural support to non-safety-related components whose failure could prevent satisfactory accomplishment of required safety-related functions;

On the basis of the above described methodology, the applicant identified both the SCs and the commodity groups that are part of the turbine gantry cranes and identified the intended functions of the structural components and commodity groups that are subject to an AMR in Table 3.6-18 in the LRA. As stated by the applicant, the SCs and commodities of the turbine gantry cranes are subject to an AMR because they perform their intended function(s) without moving parts or without change in configuration or properties, and are not subject to periodic replacement based on qualified life or specified time limit.

2.4.2.16.2 Staff Evaluation

The NRC staff reviewed Section 2.4.2.16 in the LRA and the supporting information in Section 51.3 of the Turkey Point Units 3 and 4 UFSAR to determine whether there is reasonable assurance that the SCs and commodities of the turbine gantry cranes have been adequately identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff reviewed the structural component/commodity groupings in Table 3.6-18 (i.e. runway rails, runway beams and frames, main girders, platforms, railings, gratings, ladders and stairways, trolley rails and structure, cab, anchorages/embedments, and electrical enclosures, etc.) to determine if there were any other components associated with the turbine gantry cranes that meet the scoping criteria of 10 CFR 54.4(a), but were not included within the scope of license renewal. The staff has reviewed Section 2.4.2.16 in the LRA and the Turkey Point Units 3 and 4 UFSAR. The staff also examined the components and commodities listed in Tables 3.6-18 in the LRA to determine if they are the SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). On the basis of the above review the staff did not identify any omissions by the applicant.

2.4.2.16.3 Conclusions

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has appropriately identified the components of the turbine gantry cranes that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.2.17 Turkey Point Units 1 and 2 Chimneys

In Section 2.4.2.17, "Turkey Point Units 1 and 2 Chimneys," of the LRA, the applicant describes the structural components of the chimneys that are within the scope of license renewal and subject to an AMR. The chimneys are further described in Section 5A-1.4.2 of the Turkey Point UFSAR.

2.4.2.17.1 Summary of Technical Information in the Application

As stated in the LRA, Turkey Point Units 3 and 4 are located adjacent to oil and gas fired Units 1 and 2 at the Turkey Point Plant. The Unit 1 and 2 chimneys are located directly north of the Unit 3 containment structure. The chimneys do not perform any safety-related functions nor directly protect any safety-related equipment. However, failure of the chimneys has the potential to adversely affect safety-related systems (i.e., systems that are housed in and support the Unit 3 containment and other safety-related systems). As stated in Section 5A-1.4.2 in the UFSAR, the chimneys have been designed not to fail in order to preclude adverse interactions with safety-related equipment. Accordingly, the chimneys have been designed to Class I seismic loads and wind loads including hurricane loads of 145 mph and tornado loads of 225 mph.

The applicant has determined that the Turkey Point Units 1 and 2 chimneys meet the intent of 10 CFR 54.4(a)(2) for license renewal. The applicant listed the passive and long-lived components and commodities unique to the Units 1 and 2 chimneys in Table 3.6-19.

The applicant describes its methodology for identifying the SCs within the scope of license renewal in Section 2.1.1 of the LRA. Based on its scoping methodology, the applicant, in Section 2.2, Table 2.2-2 in the LRA, identified the Turkey Point, Units 1 and 2, chimneys as being within scope of license renewal and describes the results of its scoping methodology in Section 2.4.2.17 in the LRA.

The Turkey Point, Units 1 and 2, chimneys and their associated SCs meet the intent of 10 CFR 54.4(a)(1) and (a)(2) for license renewal because they perform functions as follows:

- they are non-safety related structures whose failure could prevent satisfactory accomplishment of required safety-related functions.

On the basis of the above described methodology, the applicant identified both the SCs and the commodity groups that are part of the chimneys and identified the intended functions of the SCs and commodity groups that are subject to an AMR in Table 3.6-19 in the LRA. As stated by the applicant, the SCs and commodities of the chimneys are subject to an AMR because they perform their intended function(s) without moving parts or without change in configuration or properties, and are not subject to periodic replacement based on qualified life or specified time limit.

2.4.2.17.2 Staff Evaluation

The NRC staff reviewed Section 2.4.2.17 in the LRA and the supporting information in Section 5A-1.4.2 of the Turkey Point, Units 3 and 4, UFSAR to determine whether there is reasonable assurance that the SCs and commodities of the Turkey Point, Units 1 and 2, chimneys have been adequately identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

The staff reviewed the SCs/commodity groupings in Table 3.6-19 (i.e., reinforced concrete chimney and reinforced concrete foundation) to determine if there were any other components associated with the chimneys that meet the scoping criteria of 10 CFR 54.4(a) but was not included within the scope of license renewal. The staff has reviewed Section 2.4.2.17 in the LRA and the Turkey Point Units 3 and 4 UFSAR. The staff also examined the components and commodities listed in Tables 3.6-19 in the LRA to determine if they are the SCs that are subject to an AMR in accordance with 10 CFR 54.21(a)(1). On the basis of the above review the staff did not identify any omissions by the applicant.

2.4.2.17.3 Conclusions

On the basis of the review described above, the staff found that there is reasonable assurance that the applicant has appropriately identified the components of the Turkey Point, Units 1 and 2, chimneys that are within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), respectively.

2.4.2.18 Yard Structures

In LRA Section 2.4.2.18, "Yard Structures," the applicant describes the yard structures at the plant site, and identifies the structural components of the yard structures that are within the scope of license renewal and subject to AMR. The general location of the yard structures is identified in Figure 2.2-1 in the LRA.

2.4.2.18.1 Summary of Technical Information in the Application

As described in Section 2.4.2.18.1 of the LRA, the yard structures include concrete foundations for miscellaneous components and structures, concrete trenches for piping (e.g., intake cooling water and safety injection piping) and utilities, concrete electrical duct banks, and manholes. These yard structures for Turkey Point Units 3 and 4 include:

- condensate storage tank foundations
- Unit 3 emergency diesel fuel oil storage tank foundation
- 3A and 3B EDG fuel oil transfer pump foundations
- refueling water storage tank foundations
- auxiliary feedwater pump foundations
- demineralized water tank foundations
- foundations for the diesel-driven instrument air compressors
- diesel-driven standby steam generator feedwater pump foundations
- raw water tank foundations
- diesel fire pump fuel oil storage tank foundations
- electric fire pump foundations
- fire water jockey pump foundations
- Unit 3 and 4 safety injection pipe trench
- electrical duct banks for various SSCs

The foundations for the two condensate storage tanks (CSTs) are Seismic Category 1 structures located at the northwest and southwest side of the Turkey Point Unit 3 and 4 containment buildings, respectively. They are circular-shaped reinforced concrete mat foundations.

The Unit 3 emergency diesel fuel oil storage tank foundation, located just east of the Unit 3 EDG building between the Unit 3 and 4 EDG buildings, is also designed to meet Seismic Category I requirements and to resist dead load, live load, and hurricane and tornado winds.

The two EDGs for each unit are supported by a diesel fuel oil storage facility that contains two diesel oil storage tanks and two EDG diesel fuel oil transfer pumps. The two Unit 4 EDG fuel oil transfer pumps, along with the 4A and 4B EDGs, are housed within the Unit 4 EDG building. The Unit 3 EDGs (3A and 3B) are housed within the unit 3 EDG building, however, the two unit 3 EDG diesel oil transfer pumps are located on separate structures (identified as yard structures in the LRA) just north of the EDG building. The foundations for the 3A and 3B EDG fuel oil transfer pumps are Seismic Category 1 structures designed to withstand the effects of earthquakes, tornados, hurricanes, and externally generated missiles. A common reinforced concrete mat foundation supports the 3A and 3B EDG fuel oil transfer pumps.

The Unit 3 and 4 refueling water storage tank (RWST) foundations are located in the yard just east of the auxiliary building between the auxiliary building and the intake structure. The RWST provides borated water to the safety injection system and the RHR and containment spray systems during maximum hypothetical accident conditions. Borated water stored in the RWST is provided through piping in the Unit 3 and 4 safety injection pipe trench. The RWST foundations and the pipe trenches are made of reinforced concrete that is designed to Seismic Category 1 requirements. It is located above the groundwater elevation and therefore not subject to adverse below-grade conditions.

Three steam turbine-driven auxiliary feedwater pumps (A, B, and C) are provided for Turkey Point Units 3 and 4. The pumps are located in a cluster along the east wall of the turbine building between the turbine building and the Unit 3 containment. The pump foundations are made of reinforced concrete that is designed to Seismic Category 1 requirements.

The demineralized water storage tank foundation is located west of the turbine building and south of the discharge canal. Water stored in the DWST is provided for cooling of some of the components in the engineered safety feature systems. The DWST foundations are made of reinforced concrete that is designed to Seismic Category 1 requirements. A portion of the DWST foundation is below grade; however, it is located above the groundwater elevation and therefore is protected from groundwater and adverse conditions.

There are two diesel-driven instrument air compressors for Units 1 and 2. The Unit 3 instrument air compressor is located just west of the Turbine building. The Unit 4 instrument air compressor is located in the southwest corner of the turbine building. The foundations for the air compressors are made of reinforced concrete that is designed to Seismic Category 1 requirements.

There is one diesel-driven standby steam generator feedwater pump that supports fire protection, anticipated transients without scram (ATWS), and/or SBO events. It is located just southwest of the unit containment. The foundation for the diesel-driven standby steam generator feedwater pump is made of reinforced concrete that is designed to seismic Category 1 requirements.

The yard structures also include foundations for two raw water tanks, the diesel fire pump fuel oil storage tank, the electric fire pump, the fire water jockey pump foundations, the Unit 3 and 4 safety injection pipe trench, electrical duct banks, and manholes.

The applicant states that the yard structures are within the scope of license renewal because they perform the following functions:

- Provide structural support or functional support to safety-related equipment shelter or protection to safety-related equipment.
- Provide fire-rated barriers to confine or retard a fire from spreading to or from missile (internal or external) barriers in adjacent area.
- Provide structural or functional support to non-safety-related equipment, failure of which could directly prevent satisfactory accomplishment of required safety-related functions.
- Provide protective barriers for internal flood events

The applicant lists the individual structural components noted above, and identifies their intended functions in Table 3.6-20 of the LRA. The structural components of the yard structures are identified under five material groups: carbon steel, carbon steel-galvanized, reinforced concrete for foundations above groundwater elevation, stainless steel, and steel (anchorages/embedments above groundwater elevation).

2.4.2.18.2 Staff Evaluation

The staff reviewed Section 2.4.2.18 of the LRA to determine if the applicant has adequately implemented its methodologies so that there is reasonable assurance that the structures and structural components of the yard structures have been properly identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

Additional supporting information is provided in Table 3.6-20, in which the applicant provides a list of the structural components of the various yard structures (i.e., the component or commodity group that comprises the yard structures), the associated intended functions, the material makeup of the component/commodity group, the environment of the structure, the aging effect of the material, and the required AMP.

The staff reviewed Section 2.4.2.18 and Table 3.6-20 of the LRA, and verified the SCs of the yard structures with the drawing in Figure 2.2-2. As a result of this review, the staff found no omissions by the applicant in scoping the yard structures as required by 10 CFR 54.4(a). The staff also found no omissions in the SCs identified in LRA Table 3.6-20 that are subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.4.2.18.3 Conclusions

On the basis of the review described above, the staff concludes that there is reasonable assurance that the applicant has appropriately identified those portions of the yard structures, and the associated structural components, that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a) and 54.21(a)(1), respectively.

2.5 Scoping and Screening Results – Electrical and Instrumentation and Controls (I&C)

In Section 2.5, "Scoping and Screening Results – Electrical and Instrumentation and Controls (I&C)," of the Turkey Point Units 3 and 4 LRA, the applicant describes the electrical components that are within the scope of license renewal and subject to an AMR. The staff reviewed this section of the LRA to determine whether there is reasonable assurance that all SSCs within the scope of license renewal have been identified, as required by 10 CFR 54.4(a), and that all SCs subject to an AMR have been identified, as required by 10 CFR 54.21(a)(1).

2.5.1 Summary of Technical Information in the Application

The screening for electrical/I&C components was performed on a generic component commodity group basis for the in-scope electrical/I&C systems listed in Tables 2.2-1, 2.2-2, and 2.2-3 of the LRA, and the methodology employed is consistent with the guidance in NEI 95-10. The screening methodology included electrical/I&C components that were separate and not part of larger components. For example, a circuit breaker was screened but not the wiring, terminal blocks, and connections inside a breaker cubicle. These components were considered to be parts of the breaker.

A review of controlled drawings, the plant equipment database, and interface with the parallel mechanical and civil/structural screening efforts were used to identify the electrical/I&C component/commodity groups the list includes all electrical/I&C NEI 95-10, Appendix B component commodity groups, with the exception of the following component/commodity groups, which were eliminated from consideration based on plant level scoping:

- electrical bus
- transmission conductors
- high-voltage insulators

The isolated-phase buses/switchyard buses, transmission conductors, and high-voltage insulators listed above are not relied on to meet the license renewal scoping requirements of 10 CFR 54.4(a).

The applicant's scoping methodology identified the following electrical/I&C component/commodity groups as meeting the screening criteria of 10 CFR 54.21(a)(1)(i) and requiring further evaluation against the criteria of 10 CFR 54.21(a)(1)(ii):

- insulated cables and connections (including splices, connectors, and terminal blocks)
- uninsulated ground conductors
- electrical/I&C penetration assemblies

2.5.2 Staff Evaluation

The staff reviewed Section 2.5 of the LRA to determine whether there is reasonable assurance that the applicant has identified the electrical components within the scope of license renewal, in accordance with 10 CFR 54.4, and subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.5.2.1 Electrical Components Within the Scope of License Renewal and Subject to an Aging Management Review

In the first step of its evaluation, the staff determined that the applicant had properly identified the electrical component types installed in the plant. The applicant developed the following comprehensive list of electrical component types installed in the plant without regard for system function or license renewal in-scope status:

- Alarm units
- Analyzers
- Annunicators
- Batteries
- Cable and connections (terminal blocks, connectors, and splices)
- Bus-insulated cables and connectors
- Cables and connections (terminal blocks, connectors, and splices)
- Bus-uninsulated ground cables
- Chargers
- Converters
- Inverters
- Circuit breakers
- Communication equipment
- Electrical/I&C controls and panel internal component assemblies
- Electrical/I&C penetration assemblies
- Elements
- Resistance temperature detectors (RTDs)
- Sensors
- Thermocouples
- Transducers
- Fuses
- Generators/motors
- Heat tracing
- Heaters
- Indicators
- Isolators
- Light bulbs
- Meters
- Power supplies
- Radiation monitors
- Recorders
- Regulators
- Relays
- Signal conditioners
- Solenoid operators
- Solid-state devices
- Surge arresters
- Switches
- Switchgear
- Motor control center
- Transformers
- Transmitters

In the second step of its evaluation, the staff reviewed the basic function of each component type and the applicant's determination of which component types perform their functions without moving parts or a change in configuration or properties (passive and long-lived components) and therefore are subject to an AMR. The staff concludes that the applicant has properly identified the passive, long-lived electrical component types.

In the third step of its evaluation, the staff reviewed the list of passive, long-lived electrical component types to determine which met the criteria of 10 CFR 54.3(a)(1) through (3). This step defined the set of electrical component types subject to an AMR.

The following is a list of in-scope electrical component types subject to an aging management review:

- Insulated cables and connections (including splices, connectors, and terminal blocks) not included in the Environmental Qualification Program
- uninsulated ground conductors
- twenty-two electrical/I&C penetration assemblies that are within the scope of license renewal but not included in the Environmental Qualification Program

Finally, the staff reviewed the information submitted by the applicant and verified that the applicant had not omitted or misclassified any electrical components requiring an AMR.

2.5.3 Conclusions

On the basis of the staff's review of the information presented in Section 2.5 of the LRA and the supporting information in the Turkey Point Units 3 and 4 UFSAR, the staff did not find any omissions by the applicant, and therefore concludes that there is reasonable assurance that the applicant has identified those parts of the electrical systems that are within the scope of license renewal, as required by 10 CFR 54.4(a), and subject to an AMR, as required by 10 CFR 54.21(a)(1).

3. Aging Management Review Results

The staff's evaluation of the applicant's aging management programs (AMPs) focuses on program elements, rather than the details of specific plant procedures. To determine whether the applicant's AMPs are adequate to manage the effects of aging so that the intended functions of systems, structures, and components (SSCs) within the scope of license renewal will be maintained in a manner that is consistent with the current licensing basis (CLB) throughout the period of extended operation, the staff used 10 elements to evaluate each program and activity. The 10 elements of an effective AMP were developed as part of the staff's draft standard review plan (SRP) for license renewal, which was released in 1997 and contained in the final SRP, NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (July 2001). This SER describes the extent to which the 10 elements apply to a particular program or activity, and evaluates each program and activity against those elements that are determined to be applicable. On the basis of the NRC's experience with maintenance programs and activities, the staff concluded that conformance with the 10 elements of an AMP, or a combination of AMPs, provides reasonable assurance that an AMP (or combination of programs and activities) is demonstrably effective at managing the applicable aging effects. The following 10 elements of an effective AMP are considered in evaluating each AMP used by the applicant to manage the applicable aging effects identified within this SER:

- program scope
- preventive or mitigative actions
- parameters monitored or inspected
- detection of aging effects
- monitoring and trending
- acceptance criteria
- corrective actions
- confirmation process
- administrative controls
- operating experience

In Section 2.0, "Structures and Components Subject to an Aging Management Review," of Appendix B to the license renewal application (LRA), the applicant states that the elements involving corrective actions and administrative controls for license renewal are in accordance with the site-controlled corrective actions program pursuant to 10 CFR Part 50, Appendix B, and cover all systems and components that are subject to an aging management review (AMR). In addition, the applicant states that the confirmation process element ensures that corrective actions have been taken and are effective. The staff's evaluation of the applicant's corrective action program, including the confirmation process, is separately discussed and generically evaluated in Section 3.1.2 of this SER.

3.1 Common Aging Management Programs

3.1.1 Chemistry Control Program

Section 3.2.4, "Chemistry Control Program," of Appendix B to the LRA includes a review of relevant material from Sections 3.2, "Reactor Coolant System," 3.3, "Engineered Safety Features Systems," 3.4, "Auxiliary Systems," 3.5, "Steam and Power," and 3.6, "Structures and

Structural Components," of the LRA. These sections address the interaction of the primary, secondary, treated water, and diesel generator fuel oil with the components in different systems and describes the resulting aging effects. The staff reviewed the applicant's description of the program in Section 3.2.4 of Appendix B to the LRA and the material in the other referenced sections of the LRA to determine whether the applicant has demonstrated that the chemistry control program will adequately manage the applicable aging effects so that the systems covered by this activity will perform their intended functions in accordance with the CLB throughout the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.1.1 Summary of Technical Information in the Application

The chemistry control program applies to the systems containing primary, secondary, and treated water, as well as diesel fuel oil. Specifically, the LRA identified the following systems:

- systems containing primary water
  - reactor coolant system
  - steam generator primary side
  - residual heat removal system
  - safety injection system
  - chemical and volume control system
  - containment spray system
  - emergency containment filtration system
  - spent fuel pool cooling system
  - spent fuel storage and handling system
  - sample system
- systems containing secondary water
  - steam generator secondary side
  - feedwater and blowdown system
  - auxiliary feedwater and condensate storage system
  - main steam and turbine generators
  - sample system
- systems containing treated water
  - component cooling water system
  - primary water makeup system
- systems containing diesel generator fuel oil
  - emergency diesel generators and support systems

The LRA identified the following aging effects caused by the water and diesel fuel oil environments:

- loss of material
- cracking
- fouling

These aging effects were caused by the following corrosion mechanisms identified in the LRA:

- general corrosion
- pitting corrosion
- crevice corrosion
- microbiologically influenced corrosion
- graphitic corrosion
- stress corrosion cracking
- intergranular attack
- corrosion fouling
- fouling caused by microbiologically influenced corrosion

The applicant concluded that the chemistry control program will allow the detection of these corrosion effects in the systems that are exposed to water or diesel fuel oil environments, and the appropriate corrective actions can be taken so that the components will perform their intended functions in a manner that is consistent with the CLB, throughout the period of extended operation.

As described in the following paragraphs, different chemical environments exist in the systems containing primary, secondary, and treated water, and diesel generator fuel oil; therefore, different types of chemistry control apply to these systems, and different types of sampling and analysis are needed.

Primary Water

The primary water identified in the LRA consists of treated water-primary and treated water-borated. The distinction between these two types of primary water is that the treated water-primary is the water in the reactor coolant system, and the treated water-borated is the water in all other systems that perform functions requiring borated water. Both of these types of water contain dissolved boric acid. In the reactor coolant system, the boron concentration is controlled by a boron/lithium/pH chemistry regime that is required for reactivity, radiation, and corrosion control. Its concentration varies during plant operation. In the systems containing treated water-borated, the concentration of boric acid remains constant. Most of the components in the systems containing primary water are made of stainless steel, but other materials (such as Alloy 600, which is used for steam generator tubing) are also present. All of these components may be subject to corrosion if the chemistry of the primary water is not properly controlled.

Secondary Water

Treated water-secondary is a demineralized water containing pH and oxygen controlling chemicals. The components in the systems containing secondary water are constructed mostly from carbon steel, although other materials (such as stainless steel or low alloy steel) are also present. Proper chemistry control is needed to prevent their corrosion.

Treated Water

Treated water is a demineralized water that is used in systems requiring clean water. Depending on its application, treated water can be deaerated and can contain corrosion inhibitors and biocides. Two systems containing treated water are included in the chemistry control program in the LRA. Specifically, these are the component cooling water (CCW) system and the primary water makeup system. The CCW system removes heat from various power plant auxiliary systems. It contains components that are made from carbon steel, stainless steel, cast iron, and brass. These materials may corrode in an uncontrolled treated water environment. The primary water makeup system stores high-purity treated water. Valves and piping in this system are included in the chemistry control program. Although these components are made from stainless steel, in an uncontrolled treated water environment, they may exhibit aging effects caused by a loss of material due to corrosion.

Diesel Generator Fuel Oil

Emergency diesel generator support systems ensure proper operation of the emergency diesel generator. The fuel oil portion of the system includes the storage tank; day tanks; skid tanks; fuel oil pumps; and various valves piping, tubing, and hoses. These components are made from carbon steel, stainless steel, cast iron, and copper. They are exposed to the environment of diesel fuel oil, which can produce aging effects due to loss of materials by corrosion in the presence of accumulated water.

3.1.1.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information in the LRA regarding the applicant's demonstration that the chemistry control program for water and fuel oil chemistries will ensure that the effects of aging will be adequately managed so that intended functions will be maintained consistent with the CLB throughout the period of extended operation for all components in the systems included in the LRA. After completing the initial review, the staff issued several requests for additional information (RAIs) by letter dated February 1, 2001. By letter dated April 19, 2001, the applicant responded to the staff's RAIs.

The staff's evaluation of the applicant's AMPs related to water and fuel oil chemistries focused on program elements, rather than detailed plant-specific procedures. To determine whether these programs adequately mitigate the effects of aging to maintain intended functions consistent with the CLB throughout the period of extended operation, the staff evaluated seven elements that apply to these programs. The corrective actions and administrative controls for license renewal were not discussed in this section because the application indicates that they are in accordance with the site-controlled quality assurance program pursuant to 10 CFR Part 50, Appendix B, and cover all structures and components that are subject to an AMR. For the confirmation process element, the applicant states that followup testing is performed to confirm

satisfactory completion of the corrective action. The staff's evaluation of the quality assurance program including the confirmation process is provided separately in Section 3.1.2 of this SER. The remaining seven elements are discussed below.

[Program Scope] In Section 3.2.4 of Appendix B to the LRA, the applicant stated that the scope of this program includes managing the aging effects of loss of material, cracking, and fouling within the systems specified in LRA Sections 3.2, 3.3, 3.4, and 3.6. The scope of inspection consists of sampling activities and analysis of treated water-primary, treated water-borated, treated water-secondary, treated water, and diesel fuel oil. Appropriate corrective actions are taken when the chemistry parameters do not meet specified limits. The staff finds that there is reasonable assurance that the applicant has included all plausible aging effects related to water and fuel oil chemistries for aging management considerations, and the scope of the chemistry control program is adequate.

[Preventive or Mitigative Actions] The objective of the chemistry control program is to ensure that the chemistry parameters for water and diesel fuel oil remain within their optimum values. Although it will not completely eliminate corrosion, the program will reduce the damaging effects of corrosion, and will ensure that the resultant aging effects will not invalidate the functions performed by the components that are exposed to water or diesel fuel oil environments. The staff finds that the chemistry control program will effectively mitigate aging effects caused by corrosion.

[Parameters Monitored or Inspected] The chemistry control program monitors chemistry parameters in different systems in the plant for the purpose of aging management. The monitoring and inspection procedures are based on the guidelines specified in Electric Power Research Institute (EPRI) reports TR-105714, Rev. 4, and TR-102134, Rev. 5, for primary and secondary water chemistries, respectively. The procedures also rely on different equipment vendor specifications, and information from water treatment experts. These procedures allow the applicant to determine the concentrations of different chemical species, including fluoride, sulfate, oxygen, biocide, and corrosion inhibitor. The chemistry control program for the diesel fuel oil relies on the American Society for Testing and Materials (ASTM) D-4176 qualitative test and the ASTM D-1796 quantitative test for monitoring water and particulate content in diesel fuel oil. The staff finds that these procedures for monitoring and inspecting chemistry parameters will help the applicant to control aging effects in the affected plant systems.

[Detection of Aging Effects] Aging effects due to corrosive environments of water and diesel fuel oil are specific for different systems, and their detection is handled by the appropriate programs described in the LRA and evaluated by the staff. Localized corrosive damage (such as crevice corrosion) is detected during routine and corrective maintenance when the inspected components are disassembled and visually inspected for loss of material and other aging effects. The staff finds that the chemistry control program has the capability to satisfactorily manage aging effects.

[Monitoring and Trending] The monitoring and trending requirements for the parameters that are controlled by the chemistry control program are included in plant procedures. The staff finds that these procedures will allow the applicant to detect operational problems and take appropriate corrective action.

[Acceptance Criteria] The acceptance criteria in the chemistry control program for the chemistry parameters to be monitored in the systems carrying primary, secondary, and treated water chemistries and diesel fuel oil are described in the Nuclear Chemistry Parameters Manual, Technical Specifications, and other plant procedures. These parameters specify operational chemistry limits for specific systems. The staff finds that these criteria will ensure that chemistries of water and diesel fuel oil will be maintained at their optimum conditions.

[Operating Experience] The applicant states that review of Turkey Point's past performance has indicated that the overall effectiveness of the program is supported by very satisfactory operating experience for the systems, structures, and components that are affected by the program. A review of plant condition reports indicated that no Level 3 chemistry excursions, as defined by EPRI's water chemistry guidelines, were experienced. The program has been subject to periodic internal and external assessments to ensure continuous effectiveness and improvement. The staff finds that the operating experience presented by the applicant supports the determination that the chemistry control program will adequately manage the aging effects associated with the chemical environments existing at the Turkey Point nuclear power plant throughout the period of extended operation.

3.1.1.3 Conclusions

The staff has reviewed the information in Section 3.2.4 of Appendix B to the LRA and the applicant's responses to staff's RAIs. On the basis of its review, the staff concludes that the applicant has demonstrated that there is reasonable assurance that the chemistry control program will adequately manage aging effects associated with primary, secondary, treated water, and diesel generator fuel oil chemistries in accordance with the CLB throughout the period of extended operation.

3.1.2 FPL Quality Assurance Program

The NRC staff has reviewed LRA Section 3.1.2, "FPL Quality Assurance Program," in accordance with 10 CFR 54.21(a)(3) and 10 CFR 54.21(d). In Section 3.1.2 of the LRA, the applicant references its quality assurance program information contained in Section 2.0, "Aging Management Program Attributes," of Appendix B, "Aging Management Programs," to the LRA. The staff has evaluated the adequacy of certain aspects of the applicant's programs to manage the effects of aging. The particular aspects reviewed by the staff in this section encompass three quality assurance program attributes, namely corrective actions, confirmation process, and administrative controls. These three attributes of the quality assurance program are addressed for all of the applicant's aging management programs.

The license renewal applicant is required to demonstrate that the effects of aging on structures and components that are subject to an AMR will be adequately managed to ensure that their intended functions will be maintained in a manner that is consistent with the CLB of the facility throughout the period of extended operation. Therefore, those aspects of the aging management process that affect the quality of safety-related SSCs are subject to the quality assurance requirements of Appendix B to 10 CFR Part 50. For non-safety-related SSCs that are subject to an AMR, the existing 10 CFR Part 50, Appendix B, quality assurance program may be used by the applicant to address the attributes of corrective actions, confirmation process, and administrative controls.

3.1.2.1 Summary of Technical Information in Application

In Section 2.0 of Appendix B to the LRA, the applicant provides a generic description of the corrective actions, administrative controls, and confirmation process common to all aging management programs within the scope of license renewal. In this section, the applicant states that the corrective actions and administrative controls apply to all aging management programs that are credited for license renewal. The confirmation process is described as a process to ensure that adequate corrective actions have been completed and are effective. The corrective actions and administrative controls are described as part of the applicant's quality assurance program required by 10 CFR Part 50, Appendix B. For each aging management program listed in Section 3.0, "Aging Management Programs," of Appendix B to the LRA, the confirmation process is described as establishing followup examination requirements based on the evaluation of the inspection results. Also, the applicant states that it will enter unacceptable inspection results into its corrective action program.

The applicant's programs and activities that are credited with managing the effects of aging can be divided into new and existing programs. As defined in Section 2.0 of Appendix B to the LRA, the applicant uses the following specific attributes to describe these programs and activities:

- Corrective Actions: A description of the action taken when the established acceptance criterion or standard is not met. This includes timely root cause determination and prevention of recurrence, as appropriate.

- Administrative Controls: The identification of the plant administrative structure under which the programs are executed.

- Scope: A clear statement of the reason why the program exists for license renewal.

- Preventive Actions: A description of preventive actions taken to mitigate the effects of the susceptible aging mechanisms, and the basis for the effectiveness of these actions.

- Parameters Monitored or Inspected: A description of parameters that are monitored or inspected, and how they relate to the degradation of the particular component or structure and its intended function.

- Detection of Aging Effects: A description of the type of action or technique used to identify or manage the aging effects or relevant conditions.

- Monitoring and Trending: A description of the monitoring, inspection, or testing frequency and sample size (if applicable).

- Acceptance Criteria: The identification of the acceptance criteria or standards for the relevant conditions to be monitored or the chosen examination methods.

- Confirmation Process: A description of the process to ensure that adequate corrective actions have been completed and are effective.

- Operating Experience and Demonstration: A summary of the operating experience of the aging management program, including past corrective actions resulting in program

enhancements or additional programs. Program demonstration is also included in this summary.

The applicant's programs and activities that demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation are described in Section 3.0, "Aging Management Programs," of Appendix B to the LRA. Summary descriptions of new and existing programs are contained in Chapter 16 of the applicant's UFSAR Supplement, which is provided in Appendix A to the LRA.

3.1.2.2 Staff Evaluation

The staff has determined the adequacy of certain aspects of the applicant's programs to manage the effects of aging. The particular aspects reviewed by the staff in this section encompass three quality assurance program attributes, namely corrective actions, confirmation process, and administrative controls. These three attributes of the quality assurance program are used by all of the applicant's aging manage programs. During the scoping/screening methodology and quality assurance audit conducted on November 13 — November 16, 2000, the NRC staff reviewed the applicant's implementation of the corrective actions, administrative controls, and confirmation process described in LRA Section 3.1.2. The results were documented in an audit report dated April 25, 2001.

Chapter 3.0, "Aging Management Review Results," of the LRA provides an aging management review summary for each unique structure, component, or commodity group at Turkey Point determined to require aging management during the period of extended operation. This summary includes identification of aging effects requiring management and aging management programs utilized to manage these aging effects. Appendix B to the LRA demonstrates how the identified programs manage aging effects using attributes described in Section 3.1.2.1 of this SER. The staff determined that the attributes identified for each program consistent with those attributes described in Section A.1, "Aging Management Review — Generic," Table A.1-1, "Elements of an Aging Management Program for License Renewal," of the draft SRP.

Pursuant to 10 CFR 54.21, a license renewal applicant must demonstrate that the effects of aging on structures and components that are subject to an AMR will be adequately managed so that the intended functions will be maintained in a manner that is consistent with the CLB of the facility throughout the period of extended operation. Consistent with this approach, the applicant's aging management programs should contain the elements of corrective action, confirmation process, and administrative controls in order to ensure proper supervision of the aging management programs.

For all of these aging management programs, two attributes (corrective actions and administrative controls) are specifically addressed by reference to the FPL Topical Quality Assurance Report. However, neither Section 2.0 nor Section 3.0 of Appendix B to the LRA describe how the Topical Quality Assurance Report specifically addresses the confirmation process for which credit is being sought. In a February 2, 2001, letter, the NRC staff requested that the applicant provide a description of how the Topical Quality Assurance Report specifically addresses the confirmation process in the context of the corrective action program. Subsequently, in a letter dated March 22, 2001, the applicant described that the confirmation process is part of the corrective action process, which is part of the Topical Quality Assurance

Report that meets the requirements of 10 CFR Part 50, Appendix B. The applicant's response resolved this open item.

Based on the information provided in the LRA, as supplemented by the applicant's letter, the NRC staff has determined that the corrective actions, confirmation process, and administrative controls are addressed in the applicant's approved quality assurance program. The staff has also determined that all aging management programs within the scope of license renewal are subject to the requirements of the applicant's quality assurance program. This includes the safety-related and non-safety-related aging management programs within the scope of license renewal. The staff finds that the FPL Topical Quality Assurance Report contains the applicant's commitments for managerial and administrative controls, including a discussion of how the applicable requirements of Appendix B to 10 CFR Part 50 will be satisfied.

3.1.2.3 FSAR Supplement

The applicant has provided a summary description of the programs and activities for managing the effects of aging and the evaluation of time-limited aging analyses for the period of extended operation in UFSAR Chapter 16, which is also included in Appendix A to the LRA. The UFSAR Supplement provides a brief explanation of the new and existing programs that the applicant will use to manage the effects of aging. The explanation contains a summary of several important technical attributes, such as inspections and techniques used to identify aging effects. The quality assurance programs, which include three attributes (corrective actions, confirmation process, and administrative controls), are not described in the UFSAR Supplement. However, the applicant has provided a detailed description of the technical and quality assurance attributes in Appendix B to the LRA.

For non-safety-related structures and components that are subject to an AMR for license renewal, an applicant has an option to expand the scope of its 10 CFR Part 50, Appendix B, program to include these structures and components to address corrective actions, confirmation process, and administrative controls for aging management during the period of extended operation. In accordance with Appendix A.2, "Quality Assurance for Aging Management Programs (Branch Technical Position IQMB-1)," Section A.2.2, Item 2 to the draft SRP, the applicant should document a commitment to expand the scope of its 10 CFR Part 50, Appendix B, quality assurance program to include non-safety-related structures and components in the UFSAR Supplement consistent with Section 2 of Appendix B to the LRA. Several aging management programs pertain to both safety-related and non-safety-related SSCs. Therefore, committing to the FPL Quality Assurance Program for all aging management programs is acceptable. The applicant may develop another approach to meet Branch Technical Position IQMB-1. This is listed as Confirmatory Item 3.1.2-1

3.1.2.4 Conclusion

The staff finds that the quality assurance attributes are consistent with 10 CFR 54.21(a)(3). Therefore, the applicant's quality assurance description for its aging management programs is acceptable. The staff finds that the applicant's UFSAR Chapter 16 Supplement does not provide a sufficient description of the programs and activities for managing the effects of aging. Specifically, the applicant has not addressed in the supplement how the attributes of corrective actions, confirmation process, and administrative controls will be applied to aging management programs. (Confirmatory Item 3.1.2-1).

3.1.3 Systems and Structural Monitoring Program

The applicant describes its systems and structural monitoring program in Section 3.2.15 of Appendix B to the LRA. The applicant credits this inspection program with assessing the overall condition of the Turkey Point Unit 3 and 4 buildings and structures, and identifies any ongoing degradation through a visual inspection process. The program monitors and assesses the condition of structures and structural components affected by aging, which may cause loss of material, cracking, flow blockage, and change of material properties. The staff reviewed the LRA to determine whether the applicant has demonstrated that the structural monitoring program will adequately manage aging effects throughout the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1.3.1 Summary of Technical Information in the Application

In Section 3.2.15 of Appendix B to the LRA, the applicant describes the systems and structural monitoring program credited for aging management, and provides for periodic visual inspections to monitor the condition of structures, systems, components, and commodities. The structures monitored include the auxiliary building, the containments, the control building, the diesel-driven fire pump enclosure, the discharge structure, the electrical penetration rooms, the emergency diesel generator buildings, the fire protection monitoring station, the intake structure, the main steam and feedwater platforms, the plant vent stack, the spent fuel storage and handling structure, the turbine building, the turbine gantry cranes, and yard structures. There are 20 key systems monitored by this program including auxiliary building ventilation, auxiliary feedwater and condensate storage, chemical and volume control, component cooling water, containment isolation. The applicant lists the specific structural components and systems, which are fabricated from either carbon steel, stainless steel, or concrete, and inspected as part of the systems and structures monitoring program in Section 3.2.15 of Appendix B to the LRA.

The aging effects managed by the structural monitoring program are discussed in Section 3.6 of the LRA. The applicant credits this inspection program to manage loss of material, cracking, fouling, loss of seal, and change in material properties for the above listed systems, structures, and components within the scope of license renewal. The program provides for visual inspection and examination of accessible surfaces of specific systems, structures, and components, including welds and bolting. Aging management of structural components that are inaccessible for inspection is accomplished by inspecting accessible structural components with similar materials and environments for aging effects that may be indicative of aging effects for the inaccessible structural components.

The applicant states that the program will be enhanced by restructuring it to address inspection requirements to manage the aging effects in accordance with 10 CFR Part 54, modifying the scope of specific inspections, and improving documentation requirements. Commitment dates associated with the enhancement of this program are contained in Appendix A to the LRA.

3.1.3.2 Staff Evaluation

The staff's evaluation of the structural monitoring program focused on how the program manages aging effects through the effective incorporation of the following 10 elements: program scope, preventive actions, parameters monitored or inspected, detection of aging

effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience.

The corrective actions and administrative controls for license renewal were not discussed as part of the program description because the applicant indicates that they are in accordance with the site-controlled quality assurance program pursuant to 10 CFR Part 50, Appendix B, and cover all structures and components that are subject to AMR. For the confirmation process element, the applicant states that degradations identified by this program are evaluated and entered into the corrective action program. The staff's evaluation of the quality assurance program, including the confirmation process, is provided separately in Section 3.1.2 of this SER. The remaining seven elements are discussed below.

[Program Scope] The applicant lists the structures, systems, components, and commodities that are covered by the systems and structural monitoring program in Section 3.2.15 of Appendix B to the LRA. In RAI 3.9.15-1 dated February 2, 2001, the staff asked the applicant to indicate how it will manage aging effects of structural components that are inaccessible for inspection, and to discuss how it intends to manage or monitor aging effects of inaccessible structural components when conditions in accessible areas may not indicate the presence of degradation in inaccessible areas. The applicant was also asked to provide a summary discussion of specific program attributes that will be enhanced to address inspection requirements to manage certain aging effects pursuant to 10 CFR Part 54. The applicant responded by letter dated April 19, 2001, stating that aging management of structural components that are inaccessible for inspection is accomplished by inspecting accessible structural components with similar materials and environments for aging effects that may be indicative of aging effects for inaccessible structural components. This is described in the systems and structures monitoring program, Appendix B, Section 3.2.15, page B-84, of the LRA. The applicant states that since components in inaccessible areas have the same materials and environments as those in accessible areas, indications of degradation or the lack of indications in accessible areas is an effective way to manage components in inaccessible areas.

As described in the response to RAI 3.6.1.1-1, dated March 30, 2001, the applicant indicates that the systems and structures monitoring program is credited for managing aging of the inaccessible containment concrete below the groundwater. Aging effects are managed by performing visual inspections of the non-safety-related tendon access gallery concrete below groundwater to provide early indication of potential aging effects for the containment concrete.

Currently, inspections that are within the scope of the systems and structures monitoring program are performed under a variety of plant programs and processes. For the renewal term, the applicant plans to enhance these inspections by restructuring them to identify certain aging effects in accordance with 10 CFR Part 54, by adding specific structures and components that are not currently inspected under an existing program, and by improving documentation requirements. These enhancements will be incorporated prior to the end of the initial license term for Turkey Point, as described in Appendix A to the LRA, Section 16.2.15, page A-41.

With the above clarifications provided in response to the RAI, the staff finds that the scope of this program is acceptable, since it includes a walkdown inspection and aging effects assessment of all structures and components that are within the scope of license renewal. Therefore, RAI 3.9.15-1 is closed.

[Preventive Actions] The applicant stated that external surfaces of carbon steel and cast iron valves, piping, and fittings, and specific stainless steel piping welds are coated to minimize corrosion, as are and surfaces of steel structures and supports. The applicant asserts that coatings minimize corrosion by limiting exposure to the environment; however, the applicant did not take credit for coatings in the determination of the aging effects requiring management. The staff finds that the applicant's approach is acceptable.

[Parameters Monitored or Inspected] The applicant states that surface conditions of structures, system components/piping (including those exposed to a wetted environment), and supports are monitored through visual examinations to determine the existence of external corrosion and the internal corrosion of certain ventilation equipment. Flexible connections are monitored for cracking due to embrittlement, and ventilation heat exchangers are monitored for fouling. External surfaces of concrete are monitored through visual examination for exposed rebar, extensive rust bleeding, cracks that exhibit rust bleeding, and cracking of block walls and building roof seals. The applicant further states that leakage inspections of valves, piping, and fittings at limited locations of the intake cooling water and waste disposal systems are utilized to detect the presence of internal corrosion. Additionally, visual inspection of external surfaces of certain ventilation systems is used to assess internal system conditions. Inspection of protective coatings on specific stainless steel piping welds in outdoor locations will be performed to determine coating degradation. Inspection of weatherproofing material for deterioration is also performed.

With respect to this attribute, the staff's RAI 3.9.15-2, dated February 2, 2001, stated that the applicant's parameter description is incomplete. The RAI asked the applicant to augment the discussion to demonstrate that the specific parameters that are monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected, and the extent the degradation can be determined. The parameters monitored or inspected must be commensurate with industry-standard practice, and must also consider industry and plant-specific operating experience. For concrete structural elements, typical parameters to be monitored or inspected are structural cracking, spalling, scaling, erosion, corrosion of reinforcement bars, settlements, and deformation. For structural steel elements (including connections), typical parameters to be monitored or inspected are corrosion, cracking, erosion, discoloration, wear, pitting, gouges, dents, and other signs of surface irregularities.

In the applicant's response, dated April 19, 2001, the applicant stated that the systems and structures monitoring program, as described in Section 3.2.15 of Appendix B to the LRA, manages the aging effects of loss of material, cracking, fouling, loss of seal, and change in material properties to ensure that aging degradation leading to loss of intended functions will be detected. The program provides for periodic visual inspection of concrete and masonry structures, steel structures, and system commodities and components (e.g., piping, ductwork, electrical raceways, valves, heat exchangers, and electrical enclosures). The applicant further stated that the parameters monitored are selected based on industry and plant experience to ensure that aging degradation that could lead to loss of intended function will be identified and addressed. Concrete and masonry parameters monitored include exposed rebar, cracking, rust bleeding, spalling, scaling, other surface irregularities, and settlement. For steel structures, the parameters monitored include corrosion, flaking, pitting, gouges, cracking, other surface irregularities, and missing parts. For system commodities and components, the parameters monitored include corrosion, flaking, pitting, gouges, cracking, fouling, other surface irregularities, protective coating degradation on select stainless steel pipe welds, leakage at

limited locations, and missing parts. The staff finds that the parameters that are monitored or inspected as described above are adequate and acceptable because they are directly related to the degradation of civil structures, systems, and components, and visual inspections and associated aging effects evaluations of these parameters are effective means to detect degraded conditions. Therefore, RAI 3.9.15-2 is closed.

[Detection of Aging Effects] The applicant states that aging effects due to loss of material, crack initiation, fouling, loss of seal, and change in material properties are detected by visual inspection of external surfaces (including internal surfaces of certain ventilation equipment) for evidence of corrosion, cracking, leakage, fouling, or coating damage. The staff's RAI 3.9.15-5, dated February 2, 2001, asked the applicant to provide the inspection methods, inspection schedule (frequency), and inspector qualifications for each structure/aging effect combination to ensure that aging degradation will be detected and quantified before there is loss of intended functions.

In its response dated April 19, 2001, the applicant indicated that as described in Section 3.2.15 of Appendix B to the LRA, the systems and structures monitoring program employs the visual inspection method. Structures and structural commodities are visually inspected on an area basis, and system commodities and components are visually inspected on a system basis. Conditions documented and evaluated via the corrective action program may employ other methods, such as volumetric examination, to determine the extent of degradation.

The applicant stated that the inspection schedule varies depending on the system, structure, or component being inspected. Generally, inspections will be performed on a frequency of 5 years or less; however, as documented in the response to RAI 3.4.1-2, dated March 22, 2001, some inspections of the intake cooling water (ICW) system will be performed on an 18-month interval. These frequencies are based on Turkey Point plant experience regarding degradation rates and the ability of a structure or component to accommodate degradation without a loss of intended function. The frequency of inspections may be adjusted as necessary based on future inspection results and industry experience. The applicant indicated that personnel responsible for the performance of inspections and the evaluation of inspection results are qualified in accordance with the engineering training program (ETP), which is accredited by the Institute of Nuclear Power Operations (INPO) and required by 10 CFR 50.120.

The applicant stated that the inspection methods, inspection schedules, and personnel qualifications described above provide reasonable assurance that aging degradation will be detected and evaluated before there is a loss of intended functions. Based on the staff's experience with similar programs, the staff finds the applicant's approach acceptable. Therefore, RAI 3.9.15-5 is closed.

[Monitoring and Trending] The applicant's discussion did not appear to adequately address the monitoring and trending aspects of the program. Proactive monitoring and understanding of trending behavior is needed to monitor structural aging so that corrective actions can be taken prior to exceeding the acceptance criteria. The staff's RAI 3.9.15-4, dated February 2, 2001, asked the applicant to describe the monitoring and analysis activities to be included for each of the commodity groups to track the extent and rate of degradation and their relationship to the applicable acceptance criteria.

In its response dated April 19, 2001, the applicant stated that the systems and structures monitoring program is primarily credited for managing loss of material due to corrosion, as well as other aging effects identified in Section 3.2.15 of Appendix B to the LRA. Monitoring is accomplished through detailed system and structure material condition inspections, performed periodically in accordance with approved plant procedures. When degraded conditions are identified, they are evaluated and corrected via the corrective action program. Typically, this involves quantifying the extent of the condition, evaluating the capability of the structure or component to perform its intended function, and then designating appropriate corrective actions. The applicant indicated that the corrective action program includes periodic trending assessments and evaluations. When trends are identified, they are addressed under the corrective action program. Further evaluation is performed including identification and implementation of programmatic improvements, as required. Programmatic improvements may include adjustment of program scope, frequency, acceptance criteria, and/or corrective actions. Based on the description provided above, the staff finds this section of the program acceptable. Therefore, RAI 3.9.15-4 is closed.

[Acceptance Criteria] In RAI 3.9.15-3, dated February 2, 2001, the staff asked the applicant to provide additional descriptions of the criteria used to assess or categorize the overall condition of the structures and systems that are monitored. In addition, the RAI asked the applicant to discuss Turkey Point-specific criteria that are used to assess the severity of observed degradations and determine whether corrective action(s) are needed. The RAI also asked the applicant to briefly describe walkdown procedures, checklists, or inspection forms that are provided to personnel who implement the systems and structures monitoring program.

In its response dated April 19, 2001, the applicant stated that detailed structural and system/equipment material condition inspections are performed in accordance with approved plant procedures. Existing procedures include detailed guidance for inspecting and evaluating the material condition of systems, structures, and components within the scope of the program. The guidance includes specific parameters to be monitored and criteria to be used for evaluating identified degradation. In addition, the procedures provide sample forms to be used to document the analysis and assessment, and a system checklist for documenting relevant information from a system walkdown.

Conditions identified through the systems and structures monitoring program are evaluated to determine if the condition should be addressed under the FPL 10 CFR Part 50, Appendix B, corrective action program (i.e., deficient or unacceptable conditions). For example, the criterion for structural steel is loss of material exceeding $^{1}/_{32}$ of an inch, and the criterion for piping is any corrosion greater than uniform light surface corrosion. The applicant stated that the results of the inspections and testing are evaluated in accordance with the acceptance criteria in the appropriate corrective action and administrative procedures. The staff finds the above described approach reasonable and adequate. The staff also finds that this section of the program addressing acceptance criteria is acceptable. Therefore, RAI 3.9.15-3 is closed.

[Operating Experience and Demonstration] The applicant states that systems and piping/component support material condition inspections have been successfully performed at Turkey Point since the mid-1980s. The inspection requirements in support of the NRC's Maintenance Rule (10 CFR 50.65) have been in effect since 1996, and have proven effective at maintaining systems/structures material condition and detecting unsatisfactory conditions, and have resulted in effective corrective actions being taken. The applicant further states that the

systems and structures monitoring program has been an ongoing program at Turkey Point and has been enhanced over the years to include the best practices recommended by INPO and other industry guidance. Additionally, the systems and structures monitoring program will continue to support implementation of the Maintenance Rule. The effectiveness of the systems and structures monitoring program is supported by the improved system and structure material conditions documented by internal as well as external assessments of the last several years. Additionally, the systems and structures monitoring program is the subject of periodic internal and external assessments to ensure effectiveness and continued improvement. Based upon the above, the applicant asserts that continued implementation of the systems and structures monitoring program provides reasonable assurance that the aging effects (loss of material, crack initiation, fouling, loss of seal, and change in material properties) will be managed such that systems and structures within the scope of license renewal will continue to perform their intended functions consistent with the CLB throughout the period of extended operation. The staff finds that this section of the program is acceptable.

3.1.3.3 Conclusion

The staff has reviewed the information in Section 3.2.15 of Appendix B to the LRA and the applicant's responses to the staff's RAIs. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects managed by the systems and structures monitoring program will be adequately managed so that there is reasonable assurance that the commodities and components covered by this inspection program will perform their intended functions in accordance with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2 Reactor Coolant Systems

The LRA includes the following reactor coolant mechanical and structural components within the reactor coolant systems that require an AMR:

- reactor coolant piping (Class 1 and non-Class 1)
- regenerative and excess letdown heat exchangers
- pressurizers
- reactor vessels
- reactor vessel internals
- reactor coolant pumps
- steam generators

Results from AMR of these components are described in LRA Section 3.2, "Reactor Coolant Systems." The staff issued an RAI on February 2, 2001. The applicant provided the additional information by letter dated April 19, 2001.

3.2.1 Reactor Coolant Piping

The reactor coolant piping at Turkey Point consists of Class 1 and non-Class 1 components. In the LRA, the applicant provided separate descriptions of the AMR for these two classifications of piping.

3.2.1.1 Class 1 Piping

3.2.1.1.1 Summary of Technical Information in the Application

The applicant described its AMR of the Class 1 piping for license renewal in LRA Section 3.2.1.1, "Class 1 Piping," as supplemented by the April 19, 2001, response to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the Class 1 piping will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Class 1 piping is included in topical report WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components." WCAP-14575 is not incorporated by reference in the LRA, but the Turkey Point AMR was compared to WCAP-14575, as described in Section 3.2.6.2 of this SER. The draft safety evaluation (SE) for WCAP-14575 was issued by letter dated February 10, 2000. The final SE for WCAP-14575 was issued by letter dated November 8, 2000, after the Turkey Point LRA was submitted to the NRC for review. However, all of the LRA action items identified in the final SE of WCAP-14575 were addressed either as applicant action items or open items by the applicant in Tables 2.3-2 and 2.3-3 of the LRA. Specifically, the open items that were identified in the draft SE of WCAP-14575 were either resolved, or added to the list of renewal applicant action items for the final SE. The applicant's responses are discussed and evaluated in Section 3.2.6.2 of this SER.

Although topical report WCAP-14575 is not incorporated by reference in the application, the results of the applicant's AMR were compared to those of the topical report in Tables 2.3-2 and 2.3-3 of the LRA. The applicant's review concluded that the Turkey Point Unit 3 and 4 reactor coolant Class 1 piping is bounded by the description of Class 1 piping contained in WCAP-14575 with regard to design criteria and features, materials of construction, fabrication techniques, installed configuration, modes of operation, and environments/exposures. Further, the applicant concluded that the component intended functions for reactor coolant Class 1 piping are inclusive of the intended functions identified in WCAP-14575. In addition to the functions identified in WCAP-14575, the applicant identified an additional function for the flow-restricting orifices and reducers. The applicant concluded that these orifices and reducers provide throttling to limit the maximum flow through a postulated line break in an attached non-Class 1 line to a value within the makeup capability of the chemical and volume control system. These orifices and reducers provide the code class break in the applicant's evaluation.

The applicant identified additional aging effects, specifically cracking due to stress corrosion and loss of mechanical closure integrity due to aggressive chemical attack and stress corrosion cracking (SCC), not identified in the evaluation of topical report WCAP-14575.

The applicant identified that the reactor coolant Class 1 piping components are exposed to an internal environment of treated water-primary, and external environments of containment air and potential borated water leaks, as described in Tables 3.0-1 and 3.0-2 of the LRA.

The application identifies that reactor coolant Class 1 piping components are constructed of stainless steel and low alloy steel, and notes that there are no Alloy 600 penetrations associated with reactor coolant Class 1 piping components. The piping components, and their intended functions, materials, and environments are summarized in Table 3.2-1 of the LRA.

The LRA identifies cracking, reduction in fracture toughness, and loss of mechanical closure integrity as aging effects requiring management during the license renewal period for Class 1 piping. Table 3.2-1 of the LRA summarizes the environment and material combinations requiring aging management, along with the programs and activities for aging management during the license renewal period.

Cracking due to flaw growth and stress corrosion is identified in the application as an aging effect requiring management for the period of extended operation. Cracking due to fatigue is identified in the application as a time-limited aging analysis (TLAA), and is addressed in LRA Sections 4.3.1, "Summary of Technical Information in the Application," and 4.3.4, "Conclusion."

The LRA identifies that cracking due to growth of original manufacturing flaws is managed during the license renewal period through the ASME Section XI, Subsections IWB, IWC, and IWD inservice inspection (ISI) program, as supplemented by the one-time small bore piping inspection program. For cracking due to stress corrosion, the LRA identifies that specific design, fabrication, and construction measures were taken to minimize or eliminate susceptible material from reactor coolant Class 1 piping components, including preventing sensitized stainless steel from coming in contact with an aggressive environment. The LRA identifies that the chemistry control program provides additional assurance that SCC is managed.

The LRA identifies reduction in fracture toughness due to thermal embrittlement of Class 1 piping components fabricated from cast austenitic stainless steel (CASS). The LRA identifies affected components as the primary loop elbows, reactor coolant pump casings and closure flanges, and selected valves exceeding a temperature threshold criterion of 482 °F. Reduction in fracture toughness of the reactor coolant pump casings and closures is discussed in LRA Section 3.2.6, "Reactor Coolant Pumps."

The impact of thermal embrittlement on the primary loop elbows are evaluated in the primary loop leak-before-break (LBB) analysis, which has been identified as a TLAA by the applicant. This TLAA is described in LRA Section 4.7.3, "Leak-Before-Break for Reactor Coolant System Piping."

Consistent with the conclusions drawn in the NRC's safety evaluation for WCAP-14575, the applicant concludes that screening Class 1 CASS valves for susceptibility to thermal embrittlement is not required during the period of extended operation because the reduction in fracture toughness of these components should not have a significant impact on critical flaw size. The LRA further concludes that the ASME Section XI, Subsections IWB, IWC, and IWD ISI program provides assurance that reduction in fracture toughness due to thermal aging is managed, and that the intended function of the reactor coolant Class 1 CASS valves is maintained consistent with the CLB throughout the period of extended operation.

The LRA identifies that loss of mechanical closure integrity due to stress relaxation can be managed by periodic inservice inspections and leakage testing. The LRA identifies that the ASME Section XI, Subsections IWB, IWC, and IWD ISI program provides assurance that loss of mechanical closure integrity due to stress relaxation is managed, and that the intended function of reactor coolant Class 1 piping components is maintained consistent with the CLB throughout the period of extended operation.

The application identifies that loss of mechanical closure integrity due to aggressive chemical attack has been observed in the industry, and is the most common aging mechanism of concern for ferritic fasteners of stainless steel components. Mechanical closure bolting associated with reactor coolant Class 1 piping components is made of low alloy steel bolting material, and is subject to aggressive chemical attack from potential borated water leaks. The application identifies that the boric acid wastage surveillance program provides assurance that the aging mechanism of loss of mechanical closure integrity due to aggressive chemical attack is managed, and that the intended function of reactor coolant Class 1 piping components is maintained consistent with the CLB throughout the period of extended operation.
The applicant identifies applicable industry and plant-specific operating experience in LRA Section 3.2.1.1.3, "Operating Experience." The LRA notes that no additional aging effects requiring management were identified from this review of operating experience beyond those previously identified in the LRA.

3.2.1.1.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.1, "Reactor Coolant Systems," (including Table 3.2-1) and pertinent sections of Appendices A and B to the LRA regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation for the Class 1 reactor coolant piping system.

As described in Section 3.2.1.1.1 of this SER, the final SE for WCAP-14575 was issued by letter dated November 8, 2000, after the Turkey Point LRA was submitted to the NRC for review. However, all of the open items that were identified in the draft SE were either resolved or added to the list of renewal applicant action items for the final SE. Therefore, the applicant addressed all renewal applicant action items that are included in the final SE report for WCAP-14575. There were six renewal applicant action items, and six open items from the draft SE for WCAP-14575. The action items, open items, applicant's responses, and staff's evaluations are provided in Section 3.2.6.2 of this SER. From its review of this information, the staff finds that the applicant's responses (Tables 2.3-2 and 2.3-3 of the LRA) to the renewal applicant action items and open items from the draft safety evaluation resolve the applicant action items in the final SE for WCAP-14575.

3.2.1.1.2.1 Aging Effects

The applicant identifies the following aging effects for the Class 1 reactor coolant piping system:

- cracking
- reduction in fracture toughness
- loss of mechanical closure integrity

On the basis of the description of the internal and external environments, materials used, and the applicant's review of industry and plant-specific experience, the NRC staff concludes that the applicant has identified the aging effects that are applicable for the Class 1 reactor coolant piping system.

3.2.1.1.2.2 Aging Management Programs

The applicant identifies existing and new programs for managing aging effects for the Class 1 reactor coolant piping system during the license renewal term. The following existing AMPs are identified in the application:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- boric acid wastage surveillance program
- chemistry control program

Staff evaluations of these existing programs are described in Sections 3.9.1, 3.9.3, and 3.1.1 of this SER, respectively.

A new AMP identified in the application is small bore Class 1 piping inspection. Staff evaluation of this new AMP is described in Section 3.8.7 of this SER.

On the basis of the evaluations of these AMPs in the SER sections identified above, the staff concludes that these AMPs are acceptable for managing the pertinent aging effects and providing assurance that the intended function of the reactor coolant Class 1 piping components will be maintained consistent with the CLB throughout the period of extended operation.

3.2.1.1.3 FSAR Supplement

The only FSAR supplement section pertinent to the Class 1 piping system relates to the small bore Class 1 piping inspection program. This program and FSAR Supplement Section 16.1.7 are evaluated in Section 3.8.7 of this SER.

3.2.1.1.4 Conclusion

The staff has reviewed the information in Section 3.2.1.1 of the LRA, as supplemented by the April 19, 2001, response to the RAI. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the Class 1 piping will be adequately managed so that there is reasonable assurance that these systems will perform their intended functions in accordance with the CLB throughout the period of extended operation.

3.2.1.2 Non-Class 1 Piping

3.2.1.2.1 Summary of Technical Information in the Application

The applicant describes its AMR of the non-Class 1 piping for license renewal in LRA Section 3.2.1.2, "Non-Class 1 Piping," as supplemented by the April 19, 2001, response to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the non-Class 1 piping will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Reactor coolant non-Class 1 piping components are not within the scope of topical report WCAP-14575. However, several reactor coolant non-Class 1 piping components are identified

in the application as being within the scope of license renewal. The component intended function of these in-scope components is pressure boundary integrity. The reactor coolant non-Class 1 piping components requiring an AMR are listed in LRA Section 2.3.1.2.2, "Non-Class 1 Piping."

Reactor coolant non-Class 1 piping components are exposed to internal environments of air/gas, treated water, treated water-primary, and lubricating oil, as well as external environments of containment air and potential borated water leaks.

Reactor coolant non-Class 1 piping components are constructed of stainless steel, low alloy steel, carbon steel, admiralty brass, and 90/10 copper nickel. Table 3.2-1 of the LRA provides the individual reactor coolant non-Class 1 piping components, as well as their intended functions, materials, and environments.

The application identifies cracking, loss of material, and loss of mechanical closure integrity as aging effects requiring management during the license renewal period. Table 3.2-1 of the application summarizes the environment and material combination requiring aging management, along with the programs and activities for aging management during the license renewal period.

Cracking due to stress corrosion is identified in the application as an aging effect requiring management for the period of extended operation. Cracking due to fatigue is identified in the application as a TLAA, and is addressed in LRA Section 4.3.4.

For cracking due to stress corrosion, the LRA identifies that specific design, fabrication, and construction measures were taken to minimize or eliminate susceptible material from reactor coolant non-Class 1 piping components, including preventing sensitized stainless steel from coming in contact with an aggressive environment. The LRA identifies that the chemistry control program provides assurance that SCC is managed.

The LRA identifies that mechanisms that can cause loss of material for reactor coolant non-Class 1 piping components are general corrosion, crevice corrosion, pitting corrosion, microbiologically influenced corrosion (MIC), selective leaching, galvanic corrosion, and aggressive chemical attack.

General corrosion, crevice corrosion, pitting corrosion, MIC, and selective leaching have been identified as aging mechanisms for the internal surfaces of reactor coolant non-Class 1 piping components. The applicant stated that the chemistry control program is credited for managing the corrosion effects of the non-Class 1 piping components.

In addition, general corrosion and pitting corrosion have been identified as aging mechanisms for external surfaces of carbon steel components. The applicant states that although existing protective coatings applied to these surfaces have effectively protected them from corrosion effects, the systems and structures monitoring program is credited for managing the general corrosion and pitting corrosion for the external surfaces of the non-Class 1 piping components.

Galvanic corrosion has been identified as an aging mechanism between the reactor coolant pump lower bearing heat exchanger tube coil (copper alloy) and the component cooling water (CCW) supply piping (carbon steel), and between the reactor coolant pump upper bearing heat

exchanger tubes (brass) and the carbon steel heat exchanger tube sheet. The applicant stated that although galvanic action is considered to be a corrosion mechanism, no adverse effect of galvanic corrosion has been identified for these material combinations and environments at Turkey Point. The applicant stated that the galvanic corrosion susceptibility inspection program is credited for managing the galvanic corrosion of the non-Class 1 piping components.

Aggressive chemical attack is corrosion that may be localized or general, and is caused by a corrodent that is particularly active on a specified material. Highly concentrated boric acid solutions or deposits of boric acid crystals may be very corrosive for carbon steel. Aggressive chemical attack is, therefore, identified as an aging mechanism for external surfaces of carbon steel components that are exposed to potential borated water leaks. The applicant states that the boric acid wastage surveillance program is credited for managing the loss of material due to aggressive chemical attack.

The LRA identifies that loss of mechanical closure integrity due to aggressive chemical attack has been observed in the industry and is the most common aging mechanism of concern for ferritic fasteners of stainless steel components. Mechanical closure bolting associated with reactor coolant non-Class 1 piping components is made of low alloy steel bolting material, and is subject to aggressive chemical attack from potential borated water leaks. The LRA identifies that the boric acid wastage surveillance program provides assurance that the aging mechanism of loss of mechanical closure integrity due to aggressive chemical attack is managed, and that the intended function of reactor coolant non-Class 1 piping components is maintained consistent with the CLB throughout the period of extended operation.

The applicant identifies industry and plant-specific operating experience in LRA Section 3.2.1.2.3, "Operating Experience." The application notes that no additional aging effects requiring management were identified from this review of operating experience beyond those previously identified in the application.

3.2.1.2.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.1 (including Table 3.2-1), pertinent sections of Appendices A and B to the LRA, and the applicant's responses to the staff's RAIs, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation for the reactor coolant non-Class 1 piping system.

3.2.1.2.2.1 Aging Effects

The applicant identifies the following aging effects for the reactor coolant non-Class 1 piping components:

- cracking
- loss of material
- loss of mechanical closure integrity

The inner reactor vessel flange O-ring leak detection line tubing, fittings, and valves, and the reactor vessel head vent piping, fittings, and valves are located downstream of restricting

orifices that limit reactor coolant flow in the case of a rupture in these items. In addition, the inner reactor vessel flange O-ring leak detection line is pressurized with a nitrogen environment during operation, as described in the April 19, 2001, response to RAI 3.2.1-1, thereby precluding cracking of the items in this line. On the basis of the restricting orifices and the nitrogen environment, the staff agrees with the applicant's conclusions regarding the applicable aging effects for these items.

On the basis of the description of the internal and external environments, materials used, the applicant's review of industry and plant-specific experience, and the applicant's RAI responses, the NRC staff concludes that the applicant has identified the aging effects that are applicable for the reactor coolant non-Class 1 piping components.

3.2.1.2.2.2 Aging Management Programs

The applicant identifies existing and new programs for managing the aging effects for the reactor coolant non-Class 1 piping components during the license renewal term. The LRA identifies the following existing AMPs:

- boric acid wastage surveillance program
- chemistry control program
- systems and structures monitoring program

Staff evaluations of these existing programs are described in Sections 3.9.3, 3.1.1, and 3.1.3, respectively, of this SER.

A new AMP identified in the application is the galvanic corrosion susceptibility inspection program. Staff evaluation of this new AMP is described in Section 3.8.5 of this SER.

On the basis of the evaluations of these AMPs in the SER sections identified above, the staff concludes that these AMPs are acceptable for managing the pertinent aging effects and providing assurance that the intended function(s) of the reactor coolant non-Class 1 piping components will be maintained consistent with the CLB throughout the period of extended operation.

3.2.1.2.3 FSAR Supplement

The only FSAR supplement section that is pertinent to the non-Class 1 piping system relates to the galvanic corrosion susceptibility inspection program. This program and FSAR Supplement Section 16.1.5 are evaluated in Section 3.8.5 of this SER.

3.2.1.2.4 Conclusions

The staff has reviewed the information in Section 3.2.1.2 of the LRA, as supplemented by the April 19, 2001, responses to the RAI. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the non-Class 1 piping will be adequately managed so that there is reasonable assurance that these systems will perform their intended functions in accordance with the CLB during the period of extended operation.

3.2.2 Regenerative and Excess Letdown Heat Exchangers

The regenerative and excess letdown heat exchangers are a part of chemical and volume control. They are addressed in this section, however, because they are within the reactor coolant system (RCS) pressure boundary. The regenerative and excess letdown heat exchangers are described in UFSAR Section 9.2.

3.2.2.1 Summary of Technical Information in the Application

The applicant describes its AMR of the regenerative and excess letdown heat exchangers for license renewal in LRA Section 3.2.2, "Regenerative and Excess Letdown Heat Exchangers," as supplemented by the April 19, 2001, responses to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the regenerative and excess letdown heat exchangers will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

The regenerative heat exchangers have a multiple shell and U-tube design, each consisting of three heat exchangers interconnected in series by piping and mounted on a common support frame. The heat exchangers are designed to recover heat from the letdown stream by heating the charging stream, thus minimizing reactivity effects due to injection of cold water and minimizing thermal stress on the charging line penetrations in the reactor coolant loop piping. The letdown stream flows through the shell of the heat exchangers, and the charging stream flows through the tubes.

The excess letdown heat exchangers have a U-tube design. Their function is to cool reactor coolant letdown flow equivalent to that portion of the nominal seal injection flow that enters the RCS through the labyrinth of the reactor coolant pump (RCP) seals. They may be used when the normal letdown path is temporarily out of service or for supplementing the maximum letdown during heatup. The letdown is a four-pass flow through the tubes, while CCW system flow is a single pass through the shells.

In Section 2.3.1.3 of the LRA, the applicant states that the intended functions of the regenerative and excess letdown heat exchangers are pressure boundary integrity and heat transfer.

Aging Effects

The regenerative and excess letdown heat exchangers are exposed to internal environments of treated water and treated water-primary, and external environments of containment air and potential borated water leaks (see Tables 3.0-1 and 3.0-2 of the LRA).

The regenerative and excess letdown heat exchangers are constructed of stainless steel, low alloy steel, and carbon steel. The heat exchanger components and their intended functions, materials, and environments are summarized in Table 3.2-1 of the LRA.

In Section 3.2.6 of the LRA, the applicant identifies the following aging effects for the regenerative and excess letdown heat exchangers:

- stress corrosion cracking
- loss of material due to corrosion and aggressive chemical attack
- loss of mechanical closure integrity (by stress relaxation and/or aggressive chemical attack)
- fouling

In Section 3.2.2.2.1 of the LRA, the applicant states that specific design, fabrication, and construction measures were taken to minimize or eliminate material susceptible to SCC in the regenerative and excess letdown heat exchangers. In addition, to reduce the susceptibility of regenerative and excess letdown heat exchangers materials to SCC, Turkey Point prevents sensitized stainless steels from coming in contact with an aggressive environment.

In Section 3.2.2.2.2 of the LRA, the applicant identifies several forms of corrosion and aggressive chemical attack as aging mechanisms that can cause loss of material for the regenerative and excess letdown heat exchangers. Specifically, these forms of corrosion are general, crevice, pitting, galvanic, and MIC. The applicant notes that the regenerative heat exchangers are an all welded, stainless steel construction and not subject to loss of material. The applicant states that general corrosion has been identified as an aging mechanism for internal carbon steel surfaces of the excess letdown heat exchangers. MIC has been identified as an aging mechanism for the stainless steel tube sheets and the outside diameter of the stainless steel tubing of the excess letdown heat exchangers. These parts are exposed to CCW that contains dissolved oxygen.

Section 3.2.2.2.2 of the LRA also identifies galvanic corrosion as an aging mechanism for the internal surfaces of the carbon steel shells of the excess letdown heat exchangers at the vicinity of their contact point with the stainless steel tube sheets. Although galvanic action is considered to be a corrosion mechanism, no adverse effect of galvanic corrosion has been identified for these material combinations and environments at Turkey Point.

The LRA states that the external carbon steel surfaces of the excess letdown heat exchanger shells are exposed to the containment air environment, and are typically wetted with condensation when operating. General corrosion, crevice corrosion, pitting corrosion, and MIC were identified by the applicant as aging mechanisms for external carbon steel surfaces of the excess letdown heat exchangers. Aggressive chemical attack was identified by the applicant as an aging mechanism for the excess letdown heat exchanger external surfaces that are exposed to potential borated water leaks.

Section 3.2.2.2.3 of the LRA states that loss of mechanical closure integrity can result from aggressive chemical attack. Loss of mechanical closure integrity due to aggressive chemical attack has been observed in the industry, and is the most common aging mechanism of concern for ferritic fasteners of stainless steel components. The LRA notes that mechanical closure bolting associated with the excess letdown heat exchangers is made of low alloy steel bolting material, and is subject to aggressive chemical attack from potential borated water leaks. In addition, there are no bolted mechanical closures associated with the regenerative heat exchangers.

Section 3.2.2.2.4 of the LRA identifies biological fouling as an aging mechanism affecting the excess letdown heat exchanger tubing that is exposed to CCW. Particulate fouling has been identified as an aging mechanism for the regenerative and excess letdown heat exchanger tubing.

Industry Experience

The applicant performed a review of industry operating history and NRC generic communications to validate the set of aging effects that require management. Specifically, the applicant reviewed the following industry correspondence for regenerative and excess letdown heat exchangers operating experience:

- NRC Bulletin 79-17, "Pipe Cracks in Stagnant Borated Water Systems at PWR Plants"
- NRC Circular 76-06, "Stress Corrosion Cracks in Stagnant, Low-Pressure Stainless Piping Containing Boric Acid Solution at PWRs"
- NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants"
- NRC Information Notice 79-19, "Pipe Cracks in Stagnant Borated Water Systems at PWR Plants"
- SAND 93-7070, "Aging Management Guideline for Commercial Nuclear Power Plants — Heat Exchangers"

No aging effects requiring management were identified from the above documents beyond those already identified in Section 3.2.2.2 of the LRA.

Plant-Specific Experience

The applicant reviewed Turkey Point Unit 3 and 4 operating experience to validate the identified aging effects requiring management. This review included a survey of Turkey Point non-conformance reports, licensee event reports, and condition reports for any documented instances of regenerative and excess letdown heat exchanger component aging, in addition to interviews with responsible engineering personnel. No aging effects requiring management were identified from this review beyond those identified in Section 3.2.2.2 of the LRA.

3.2.2.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.2 (including Table 3.2-1) and pertinent sections of Appendices A and B to the LRA, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation for the regenerative and excess letdown heat exchangers.

3.2.2.2.1 Aging Effects

The applicant states that the applicable aging effects include the following:

- stress corrosion cracking
- loss of material due to corrosion and aggressive chemical attack
- loss of mechanical closure integrity (by stress relaxation and/or aggressive chemical attack)

- fouling

By letter dated February 2, 2001, the staff requested additional information regarding the excess letdown heat exchangers. The April 19, 2001, RAI response stated that there have been three occurrences on each unit of minor leakage of borated water at the tube sheet flange gasket of the excess letdown heat exchangers. Inspections performed as part of the boric acid wastage surveillance program identified this leakage, which was characterized by boric acid residue or the presence of wetness on the exterior surfaces of the heat exchanger cover. Therefore, the leakage did not affect the intended function of the heat exchangers. Corrective actions to address this leakage included replacing the gaskets and inspecting and replacing fasteners, as required. On the basis of the timely identification of this borated water leakage, no enhancements to the boric acid wastage surveillance program were deemed necessary. No leakage from the excess letdown heat exchangers has been reported since 1995. In order to address this potential for loss of material and loss of mechanical closure integrity due to aggressive chemical attack, periodic inspections performed under the boric acid wastage surveillance program are credited for managing these aging effects.

In Section 5.4 of Appendix C, the LRA indicates that high-yield stress materials and contaminants, such as lubricants containing molybdenum disulfide (MoS_2), have caused cracking of bolting in the industry. In RAI 3.2.2-2, dated February 2, 2001, the staff requested additional information on how yield strength and elimination of contaminants will be addressed during the period of extended operation. In the April 19, 2001, RAI response, the applicant reiterated that high stress in conjunction with an aggressive environment can cause cracking of certain bolting materials due to SCC. As identified in NRC IE Bulletin 82-02 and Generic Letter 91-17, cracking of bolting in the industry has occurred due to SCC. These instances of SCC have primarily been attributed to the use of high-yield strength bolting materials, excessive torquing of fasteners, and contaminants, such as the use of lubricants containing MoS_2. In its responses to NRC IE Bulletin 82-02, dated July 15, 1983, and March 9, 1984, for Units 4 and 3, respectively, the applicant verified that (1) specific maintenance procedures are in place that address bolted closures of the reactor coolant pressure boundary with a nominal diameter of 6 inches or greater; (2) the procedures in use address detensioning and retensioning practices and gasket installation and controls; (3) threaded fastener lubricants used in the reactor coolant pressure boundary have specified maximum allowable limits for chloride and sulfur content to minimize susceptibility to SCC environments; and (4) maintenance crew training on threaded fasteners is performed.

In order for SCC to occur, the three conditions that must exist are a susceptible material, high-tensile stresses, and a corrosive environment. In its RAI response, the applicant stated that the potential for SCC of fasteners at Turkey Point is minimized by utilizing ASTM A193 Gr. B7 bolting material, and limiting contaminants, such as chlorides and sulfur, in lubricants and sealant compounds. Additionally, sound maintenance bolt torquing practices are used to control bolting material stresses. The use of ASTM A193 Gr. B7 bolting specifies a minimum yield strength of 105 ksi, which is well below the 150 ksi threshold value specified in EPRI NP-5769, "Degradation of Bolting in Nuclear Power Plants," dated April 1988. Bolting fabricated in accordance with this standard could be expected to have yield strengths less than 150 ksi. However, since the maximum yield strength is not specified for this bolting material, assurance cannot be provided that the yield strength of the bolting would not exceed 150 ksi. For these cases, the combination of specifying ASTM A193 Gr. B7 bolting material, control of bolt torquing, and control of contaminants will ensure that SCC will not occur. These actions

have been effective in eliminating the potential for SCC of bolting materials. The results of a review of the Turkey Point condition report (1992 through 2000) and metallurgical report (1987 through 2000) databases support this conclusion, in that no instances of bolting degradation due to SCC were identified. Additionally, review of NRC generic communications did not identify any recent bolting failures attributed to SCC. Therefore, cracking of bolting material due to SCC is not considered an aging effect requiring management at Turkey Point.

On the basis of the description of the regenerative and excess letdown heat exchanger internal and external environments, materials used in the fabrication of various regenerative and excess letdown heat exchanger components, the Turkey Point experience, the applicant's survey of industry and plant-specific experience, and the applicant's RAI responses, the NRC staff concludes that the applicant has identified the aging effects that are applicable for the regenerative and excess letdown heat exchanger.

3.2.2.2.2 Aging Management Programs

The applicant identifies existing and new programs for managing the aging effects for the regenerative and excess letdown heat exchanger during the license renewal term. The following existing AMPs will be continued during the period of extended operation:

- boric acid wastage surveillance program
- chemistry control program
- systems and structures monitoring program

Staff evaluations of these existing programs are described in Sections 3.9.3, 3.1.1 and 3.1.3, respectively, of this SER.

A new AMP identified in the application is the galvanic corrosion susceptibility inspection program. Staff evaluation of this new program is described in Section 3.8.5 of this SER.

On the basis of the evaluations of these AMPs in the SER sections identified above, the staff concludes that these AMPs are acceptable for managing the pertinent aging effects and providing assurance that the intended function(s) of the regenerative and excess letdown heat exchangers will be maintained consistent with the CLB throughout the period of extended operation.

3.2.2.3 FSAR Supplement

On the basis of the staff's evaluation described above, the summary description for the regenerative and excess letdown heat exchangers contained in Appendix A to the LRA is acceptable.

3.2.2.4 Conclusions

The staff has reviewed the information in Section 3.2.2 and Appendices A and B to the LRA, as supplemented by the April 19, 2001, responses to the RAI. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the regenerative and excess letdown heat exchangers will be adequately managed so that there is

reasonable assurance that these systems will perform their intended functions in accordance with the CLB during the period of extended operation.

3.2.3 Pressurizers

3.2.3.1 Summary of Technical Information in the Application

The applicant described its AMR of the pressurizers for license renewal in LRA Section 3.2.3, "Pressurizers," as supplemented by the April 19, 2001, responses to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the pressurizers will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Components of the Turkey Point Unit 3 and 4 pressurizers that are subject to aging management are identified in Table 3.2-1 to the Turkey Point LRA. The LRA identifies that a plant-specific aging management evaluation was performed for components in the pressurizers of Turkey Point, Units 3 and 4, and states that the plant-specific aging management evaluation for the pressurizers was compared to the aging management evaluation for Westinghouse-designed pressurizers, as described in topical report WCAP-14574, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers." With respect to the comparison with WCAP-14574, the LRA states that the pressurizers at Turkey Point, Units 3 and 4, are bounded by the description of pressurizers in WCAP-14574 with respect to design criteria and features, modes of operation, intended functions, and environments/exposures.

Materials and Environments

Section 3.2.3.1 of the LRA identifies that the pressurizers are exposed to treated primary water on internal surfaces, and to containment air on external surfaces. The LRA clarifies that the external surfaces of the pressurizers may be exposed to borated water if leaks occur from the primary boundary. Section 3.2.3.1 of the LRA also identifies that the materials for pressurizer components correspond to those described in WCAP-14574, with the exception of the pressurizer shells, which are fabricated from ASTM A-302, Grade B low alloy steel instead of the SA-533 Grade A, Class 2 quenched and tempered steel.

Aging Effects

The LRA identifies that the following aging effects require aging management for pressurizer components that are within the scope of license renewal:

- cracking
- loss of material
- loss of mechanical closure integrity

The LRA states that cracking may be subdivided into the following aspects that require management during the proposed periods of extended operations: (1) growth of existing flaws, (2) cracks induced by stress corrosion, and (3) cracks induced by fatigue. In so doing, the LRA adds growth of existing flaws in pressurizer components as an aging effect that requires management. The applicant also identifies that loss of material on the external surfaces of the pressurizer may result from aggressive chemical attack if borated water leaks from the internal

environment of the pressurizer. The LRA identifies that this aggressive attack may result in a loss of mechanical closure integrity if the aggressive attack occurs on ferritic fasteners of stainless steel components or low alloy steel bolting materials. The LRA also identifies that loss of mechanical closure integrity may also occur as a result of stress relaxation.

The aging effects requiring management and the programs and activities to manage the aging effects for each applicable environment and material combination are provided in Table 3.2-1 of the LRA. The LRA also states that the descriptions of the individual AMPs for managing the aging effects are provided in Appendix B to the LRA, and are based on the 10 program attributes described in Appendix B to the LRA. This is in contrast to basing the AMPs on six program attributes as defined in Table 4-1 of WCAP-14574.

Operating Experience

The LRA provides a list of the NRC's generic communications that were reviewed as part of the aging management evaluation for the pressurizers described in Section 3.2.3.3 of the LRA. In addition, the applicant indicates that it performed a review of plant-specific operating experience to validate that its aging management evaluation had encompassed all possible aging effects requiring aging management. Specifically, the applicant reviewed (1) non-conformance reports, (2) licensee event reports, and (3) Turkey Point condition reports. The applicant indicates that no additional effects requiring aging management were identified as a result of its review of either pertinent NRC generic communications or plant-specific operating experience.

3.2.3.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.3 (including Table 3.2-1) and pertinent sections of Appendices A and B to the LRA for Turkey Point Units 3 and 4, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation for the pressurizers. By letter dated February 2, 2001, the staff issued RAIs for the purpose of completing its review of the applicant's AMRs for the Turkey Point pressurizers. The evaluation that follows is based on the staff's review of Section 3.2.3 and Table 3.2-1 of the LRA, pertinent portions of Appendices A and B of the LRA, and the applicant's April 19, 2001, RAI responses.

Action Items from Previous Staff Evaluation of WCAP-14574

As stated in Section 3.2.3.1 of this SER, the applicant indicated that the results of its AMR for the Turkey Point pressurizers were compared to the AMR in WCAP-14574. During the staff's review of the AMR for the Turkey Point pressurizers, the staff determined that four of the applicant action items summarized in the staff's SER on WCAP-14574 were applicable to the AMR for the Turkey Point pressurizers. The staff requested that the applicant address these action items (RAIs 3.2.3-1 to 3.2.3-4) to demonstrate that its AMRs for the pressurizers are consistent with the assumptions in the topical report. As discussed below, the staff finds that the applicant's responses to these RAIs resolve these action items:

Applicant Action Item 1 (RAI 3.2.3-1):

The topical report concluded that general corrosion is not significant for the internal surfaces of Westinghouse-designed pressurizers and that no further evaluations of general corrosion are necessary. In its SER on WCAP-14574 the staff concurred that hydrogen overpressure would be a sufficient means of mitigating the aggressive corrosive effect of oxygen in creviced geometries on the internal pressurizer surfaces. The staff therefore requested applicants for license renewal to provide a basis demonstrating that their water chemistry control programs will provide for a sufficient level of hydrogen overpressure to manage general corrosion of the internal surfaces of their pressurizer.

Response: In its April 19, 2001, RAI response, the applicant indicated that hydrogen concentrations in the RCS are strictly maintained within specified limits by taking periodic measurements of the hydrogen concentrations as part of the applicant's water chemistry control program, and adjusting the hydrogen overpressure in the volume control tanks accordingly.

The staff concludes that this response is sufficient to ensure that loss of material due to crevice corrosion will not be significant for the internal surfaces of the pressurizers during the license renewal period. Therefore, the staff concludes that loss of material due to crevice corrosion is not an aging effect that needs to be managed during the license renewal period, consistent with the staff's conclusions in the final SER on WCAP-14574.

Applicant Action Item 2 (RAI 3.2.3-2):

In its SER on WCAP-14574 the staff concurred with the topical report finding that the potential to develop SCC in the bolting materials will be minimized if the yield strength of the material is held to less than 150 ksi, or the hardness is less than 32 on the Rockwell C hardness scale; however, the staff concluded that conformance with the minimum yield strength criteria in ASME Specification SA–193 Grade B7 does not preclude a quenched and tempered low-alloy steel from developing SCC, especially if the acceptable yield strength is greater than 150 ksi. To verify that SCC would not be an applicable aging effect for the SA–193 Grade B7 bolting material, the staff requested that the applicant provide a confirmatory statement that the acceptable yield strengths for the quenched and tempered low-alloy steel bolting materials (e.g., SA–193, Grade B7 materials) are in the range of 105–150 ksi.

Response: In its April 19, 2001, RAI response, the applicant indicated that although procurement of the bolting materials to ASTM Standard Specification A–193 would provide assurance of a 105 ksi minimum yield strength for the SA–193 Grade B7 bolting materials, it could not provide assurance that the yield strength for bolting materials would be less than 150 ksi.

The applicant also indicated that SCC of bolting materials has been primarily attributed to use of high-yield strength bolting materials, excessive torquing of the fasteners for these bolts, and the introduction of contaminants such as the use of lubricants containing molybdenum disulfide. The applicant stated that the combined practices of procuring the pressurizer bolting materials to SA–193, Grade B7, controlling torquing of these bolts through use of approved plant procedures, and controlling introduction of contaminants by

limiting the chloride and sulfide levels of lubricants used in bolting applications is effective in limiting the potential for SCC to develop in the bolting materials.

The applicant also indicated that a review of its condition report and metallurgical report databases and the NRC's generic communications support the conclusion that no instances of bolting degradation due to SCC have been identified in the industry. These findings, when combined with the practices identified in the previous paragraph, support the conclusion that SCC of SA–193 Grade B7 pressurizer bolting materials is not an aging effect that needs to be managed during the license renewal period.

The staff concludes that these bases are sufficient to ensure that SCC is not an aging effect that requires management for the pressurizer SA–193 Grade B7 bolting materials, and therefore, does not need to be managed for the pressurizer bolting materials during the license renewal period. This finding is consistent with the staff's findings for these materials for license renewal in NUREG-1705 and NUREG-1733, for the Calvert Cliffs and Oconee Nuclear Power Stations, respectively.

Applicant Action Item 3 (RAI 3.2.3-3):

In its SER on WCAP-14574, the staff was concerned that IGSCC in the heat-affected zone material of Type 304 stainless steel supports that are welded to the pressurizer cladding could grow as a result of thermal fatigue into the adjacent pressure boundary during the license renewal term. The staff considered that these welds would not require aging management in the extended operating periods if applicants could provide a reasonable justification that sensitization has not occurred in these welds during the fabrication of these components. Therefore, the staff requested applicants to provide a discussion of how the implementation of its plant-specific procedures and quality assurance requirements, if any, for the welding and testing of these austenitic stainless steel components would give reasonable assurance that sensitization has not occurred in these welds and their associated heat-affected zones.

Response: In its response to RAI 3.2.3-3, the applicant indicated that it could not preclude the possibility of sensitized areas in stainless steel weldments that join internal Type 304 stainless steel supports to the cladding of the pressurizer shells. In a letter dated August 13, 2001, the applicant clarified that the scope of the AMR for the pressurizer shells (page 3.2-64 of LRA Table 3.2-1) includes the weldments of internal supports to the cladding, and that cracking due to stress corrosion is therefore identified as an aging effect that will require management for these stainless steel weldments during the extended periods of operation for the Turkey Point Units. Aging management for these weldments is provided by the Chemistry Control Program and appropriate ASME Section XI inspection requirements, which is acceptable to the staff.

Applicant Action Item 4 (RAI 3.2.3-4):

In its SER on WCAP-14574, the staff identified that applicants would need to address whether erosion is a plausible aging effect for Westinghouse-designed pressurizer surge nozzle thermal sleeves, spray nozzle thermal sleeves, surge nozzle safe-ends, and spray nozzle safe-ends, and stated that if erosion is plausible, then an AMP would be required to manage this effect.

Response: In its April 19, 2001, RAI response, the applicant indicated that it had conducted an AMR of the Turkey Point pressurizer surge nozzle thermal sleeves, spray nozzle thermal sleeves, surge nozzle safe-ends, and spray nozzle safe-ends, and had determined that these materials are fabricated from austenitic stainless steel. In its response the applicant also indicated that stainless steel materials are considered to be resistant to erosion. The applicant therefore stated that loss of material from the pressurizer surge nozzle thermal sleeves, surge nozzle safe ends, spray nozzle thermal sleeves, and spray nozzle safe ends was therefore not an aging effect that would require management during the periods of extended operation for the Turkey Point units.

The staff concurs with the applicant's conclusion that austenitic stainless steel materials are erosion-resistant materials. Since the pressurizer surge nozzle thermal sleeves, surge nozzle safe ends, spray nozzle thermal sleeves, and spray nozzle safe ends are either fabricated from austenitic stainless steel materials or clad on their internal surfaces with austenitic stainless steel materials, the staff concurs that erosion is not an aging effect that requires management for the surfaces of the pressurizer surge nozzle thermal sleeves, surge nozzle safe ends, spray nozzle thermal sleeves, and spray nozzle safe ends that will be exposed to the internal borated water environment during the license renewal period.

3.2.3.2.1 Materials and Environment

The staff has reviewed the applicant's overview of the materials of fabrication for the pressurizers, and concurs with the applicant's conclusion that the materials for fabrication of the pressurizer components are bounded by the materials of fabrication listed in Section 2.3.2 of WCAP-14574, with the exception of the pressurizer shells, which were fabricated from ASTM A-302, Grade B ferritic steel instead of SA-533 Grade A, Class 2 ferritic steel. Section 3.2.3 of the LRA concludes that the difference in the materials for the pressurizer shells does not constitute a significant deviation because the materials are essentially the same.

ASME SA-533 Grade A, Class 2 quenched and tempered steel and ASTM A-302 Grade B low alloy steel are structural steels that have been commonly used for the fabrication of pressure vessels in nuclear applications. Table 3.2.3.2.1-1 below provides a comparison of the alloying content requirements and tensile property requirements for these materials.

Table 3.2.3.1.2-1
Comparison of Alloying Content and Material Property Requirements
for ASTM A-302 Grade B Low Alloy Steel Materials and
ASME SA-533 Grade A, Class 2 Quenched and Tempered Steel Materials

Steel ID	Heat Analysis Alloy Content Requirements (Weight Percent) [a]						Material Property Requirements	
	C	Mn	P	S	Si	Mo	Min. Yield Strength (ksi)	Tensile Strength (ksi)
A-302 Grade B	0.25 [b]	1.15-1.50	0.035	0.040	0.15-0.40	0.45-0.60	50	80-100
SA-533 Grade A Class 2	0.25	1.15-1.50	0.035	0.040	0.15-0.40	0.45-0.60	70	90-115

Notes: a. Maximum allowable alloying content unless an allowable alloying range is specified.
b. Specification for plates greater than 2 inches in thickness.

A review of Table 3.2.3.1.2-1 indicates that the alloying and tensile requirements for ASME SA-533 Grade A, Class 2 steel and ASTM A-302 Grade B steel are not significantly different. Since both of these steel materials have been used in nuclear pressure vessel applications, and since the alloying and tensile property requirements are not significantly different, the staff concludes that use of ASTM A-302 Grade B low alloy steel for fabrication of the pressurizer shells does not make the pressurizers beyond the scope of the materials evaluated in topical report WCAP-14574.

Section 3.2.3.1 of the LRA summarizes the internal and external environments for the pressurizer pressure boundary components. These environments include treated, borated-primary water on the internal surfaces of the pressurizers, and containment air on the external surfaces of the pressurizers. The applicant also identifies that the external surfaces have the potential to be exposed to the borated-primary coolant if leaks occur through the pressure boundary.

The staff concludes that Section 3.2.3.1 of the LRA provides a sufficient description of the pressurizer environment, and is therefore acceptable.

3.2.3.2.2 Aging Effects

Section 3.2.3.2 of the LRA identifies that the following aging effects are the only aging effects for the pressurizers that require aging management during the proposed periods of extended operation: (1) cracking, including managing growth of pre-existing flaws, cracking due to stress corrosion, and cracking due to fatigue; (2) loss of material due to aggressive chemical attack; and (3) loss of mechanical closure integrity. By stating that the plant-specific pressurizer aging evaluation is bounded by the evaluation stated in WCAP-14574, the applicant implies that the following aging effects do not require aging management during the periods of extended operation:

- general corrosion of exposed internal pressurizer pressure boundary surfaces
- crevice corrosion of the internal surfaces of the pressure boundary components
- stress corrosion cracking of SA-193 Grade B7, low alloy steel bolting materials
- SCC of type 304 stainless steel supports that are welded to the pressurizer cladding
- irradiation embrittlement of pressurizer structural shell materials
- thermal aging of pressurizer pressure boundary components
- loss of material in pressurizer pressure boundary components due to wear
- loss of material in pressurizer pressure boundary components due to erosion
- loss of material in pressurizer pressure boundary components due to erosion/corrosion

In its final SER of WCAP-14574, the staff concurred with the finding that the pressurizer pressure boundary components would not be degraded by general corrosion, loss of material due to wear, loss of material due to erosion/corrosion, or degradation due to creep.

3.2.3.2.3 Operating Experience

In Section 3.2.3.3 of the LRA, the applicant indicates that it reviewed pertinent NRC generic communications and plant-specific operating experience in order to validate that its aging management evaluation had encompassed all possible effects requiring aging management for

the pressurizer components falling under the scope of license renewal. The plant-specific operating experience included non-conformance reports, licensee event reports, and condition reports. The applicant did not indicate whether or not it had reviewed nonconformance reports, licensee event reports, and nonconformance reports issued by other WOG-member facilities. The applicant indicated that no additional effects requiring aging management were identified as a result its review of either pertinent NRC generic communications or plant-specific operating experience.

In WCAP-14574, the WOG indicated that SCC had occurred in two instrumentation nozzles to the pressurizer of the Surry Nuclear Power Station, Unit 1. The root cause analysis for the degradation of the Surry pressurizer instrumentation nozzles is documented in Virginia Electric and Power Company Licensee Event Reports (LERs) 50-280/95-007-00 and 50-280/95-007-01, dated October 9, 1995, and February 23, 1996, respectively. WCAP-14574 stated that cracking had occurred in the pressurizer cladding of the Haddam Neck Nuclear Power Plant in 1990. This cracking is documented in a letter from Connecticut Yankee Atomic Power Company to the U.S. Nuclear Regulatory Commission Document Control Desk, "Haddam Neck Plant Pressurizer Inspection Results" (March 1992).

In RAI 3.2.3-5, the staff requested that the applicant propose an AMP to verify that thermal fatigue-induced cracking in the pressurizer cladding has not propagated through the clad into the ferritic base metal or weld metal materials beneath the clad. In its April 19, 2001, RAI response, the applicant described the following bases for its findings on its AMPs:

1. The pressurizer shell designs consider fatigue usage factors throughout the operating lifetimes of Turkey Point, Units 3 and 4, and include adequate margins.

2. Since these fatigue analyses are expected to preclude the formation of fatigue cracks in the pressurizer cladding, and since fracture mechanics evaluations of observed cracks indicate that the cracks do not grow significantly over the plant's lifetime, an AMP is not necessary to manage postulated fatigue-induced cracking of the pressurizer cladding.

3. While a specific AMP is not required for the pressurizer cladding, the ASME Section XI ISI program is credited for managing the potential for the pressurizer surge nozzles, which are the limiting pressurizer locations from a fatigue usage perspective, to crack as a result of fatigue.

It needs to be stated that the applicant does not always credit the Turkey Point Unit 3 and 4 ISI programs as being aging programs that will manage the cracking during the extended operating terms. However, the fact that the applicant may not be crediting the ISI program for managing cracking during license renewal does not mean that the applicant will be omitting the inspections of the pressurizer components that are required to be inspected under the current ISI programs for the units. The applicant will continue to perform all required ISI inspections of pressurizer components in conformance with 10 CFR 50.55a and Section XI of the ASME Code during the extended operating terms for the units. When taken in context with the information in Items 1 through 3 above, the applicant has provided a reasonable assurance that fatigue-induced cracking of the pressurizer cladding will be managed during the proposed term of extended operation, even though the applicant has not formally credited the Section XI ISI programs as managing this effect in the LRA analysis for the pressurizers. This is acceptable to the staff.

3.2.3.2.4 Aging Management Programs

In Section 3.2.3.4 of the LRA, the applicant states that, as a result of its review of industry information, NRC generic communications, and operating experience, no additional aging effects beyond those listed in Section 3.2.3.3 of the LRA and those summarized in Table 3.2-1 for the pressurizer components need be evaluated during the license renewal period. The applicant also indicated that the aging effects identified in Section 3.2.3.2 of the LRA would be managed through implementation of the following existing programs:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- boric acid wastage surveillance program
- chemistry control program

Staff evaluations of these existing programs are described in Sections 3.9.1, 3.9.3, and 3.1.1 of this SER, respectively.

On the basis of the evaluations of these AMPs in the SER sections described above, the staff concludes that these AMPs are acceptable for managing the pertinent aging effects and providing assurance that the intended function(s) of the pressurizers will be maintained consistent with the CLB throughout the period of extended operation.

3.2.3.3 Conclusion

The staff has reviewed the information in Section 3.2.3 of the LRA, as supplemented by the April 19, 2001, and August 13, 2001, responses to the RAI. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the pressurizers will be adequately managed so that there is reasonable assurance that these systems will perform their intended functions in accordance with the CLB during the period of extended operation.

3.2.4 Reactor Vessels

The reactor vessel (RV) components in the internal environment consist of the closure head domes, closure head flanges, upper shell flanges, upper shells, primary inlet and outlet nozzles, primary nozzle safe ends, intermediate and lower shell welds, circumferential welds, bottom head toruses and domes, control rod drive mechanism rod travel housings/latch housings/flanges/housing tubes, head vent pipes, O-ring leak monitor tubes, core support lugs, instrumentation tubes and safe ends, bottom-mounted instrumentation guide tubes and seal table fittings.

The RV components in the external environment consist of the closure head domes (includes lifting lugs), closure head flanges, upper shells, primary inlet and outlet nozzles, intermediate and lower shells, upper shell flanges, refueling seal ledges, primary nozzle safe ends, nozzle support pads, bottom head toruses, bottom head domes, control rod drive mechanism rod travel housings/latch housings/flanges/housing tubes/ventilation shroud support rings, head vent pipes, O-ring leak monitor tubes, instrumentation tubes and safe ends, bottom-mounted instrumentation guide tubes, bottom-mounted instrumentation flux thimble tubes, seal tables and fittings, and closure studs, nuts, and washers.

3.2.4.1 Summary of Technical Information in the Application

The applicant described its AMR of the RVs for license renewal in LRA Section 3.2.4, "Reactor Vessels," as supplemented by the April 19, 2001, responses to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the RVs will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

The applicant states that the RV components that are subject to an AMR include the shell and closure head, nozzles, interior attachments, and bolted closures. In addition, the applicant has included the bottom-mounted instrumentation tubing, thimble tubes, and seal tables within the scope of license renewal for Turkey Point, Units 3 and 4.

In Section 2.3.1.5 of the LRA, the applicant states that the intended functions of the RV components include pressure boundary integrity and structural support.

Materials and Environments

RV components are exposed to internal environments of treated water—primary and air/gas (o-ring leak monitor tubes), and external environments of containment air, treated water-primary (bottom mounted instrumentation guide tubes), and potential borated water leaks. The applicant states that the RV components are constructed of stainless steel, low alloy steel, carbon steel, and Alloy 600.

Aging Effects Requiring Management

In Section 3.2.4 of the LRA, the applicant identifies the following internal and external aging effects that require management during the period of extended operation for the RVs:

- cracking
- reduction in fracture toughness
- loss of material
- loss of mechanical closure integrity

The RV components, their intended functions, the materials and environments are summarized in Table 3.2-1 of the LRA.

[Cracking] Cracking due to flaw growth and stress corrosion is an aging effect requiring management for the period of extended operation. At Turkey Point, cracking due to fatigue (including RV underclad cracking) is identified as a TLAA. The staff's evaluation of fatigue is provided in Section 4.3 of this SER.

Growth of original manufacturing flaws over time by service loading can cause cracking. Detection and evaluation of flaws is important in maintaining the structural integrity of the RV pressure boundary. ASME Section XI inservice examinations of components are intended to detect significant flaw growth and development. These examinations provide assurance that significant flaws do not exist, or a large flaw subject to crack growth would be detected so that it could be characterized, evaluated, and repaired, if necessary.

SCC is a localized, non-ductile failure caused by a combination of stress, susceptible material, and an aggressive environment. Specific design, fabrication, and construction measures were taken to minimize or eliminate susceptible material from the RVs. In addition, to reduce the susceptibility of RV materials to SCC, Turkey Point prevents sensitized stainless steels from coming in contact with an aggressive environment. The chemistry control program provides assurance that SCC will be managed and that the intended function of the RVs will be maintained consistent with the CLB throughout the period of extended operation.

Primary water SCC of the control rod drive mechanism (CRDM) housing tubes is a recognized industry issue. The RV head Alloy 600 penetration inspection program has been specifically designed to address primary water SCC of CRDM housing tubes. The RV head Alloy 600 penetration inspection program, in conjunction with the ASME Section XI, Subsections IWB, IWC, and IWD ISI program and the chemistry control program, provide assurance that the intended function of the CRDM housing tubes is maintained consistent with the CLB throughout the period of extended operation. Note that the RVs are the only reactor coolant system components with Alloy 600 penetrations at Turkey Point.

SCC is an aging mechanism for RV closure studs and nuts. Visual, surface, and volumetric inspections performed as part of the ASME Section XI, Subsections IWB, IWC, and IWD ISI program have been proven to be effective for managing the aging effects of SCC and provide assurance that the intended function(s) of the RV closure studs and nuts will be maintained consistent with the CLB throughout the period of extended operation.

SCC of the external surfaces of the bottom-mounted instrumentation guide tubes has been previously experienced at Turkey Point. The boric acid wastage surveillance program provides assurance that the intended function(s) of the bottom mounted instrumentation guide tubes will be maintained consistent with the CLB throughout the period of extended operation.

[Reduction in Fracture Toughness] Fracture toughness of RV materials is primarily reduced by irradiation in the beltline region of the RV. Reduction in fracture toughness of RV beltline materials is an aging effect that requires management during the license renewal period. Several TLAAs associated with reduction in fracture toughness are addressed in Section 4.2 of the LRA. These TLAAs include pressurized thermal shock (PTS), upper-shelf energy (USE), and pressure-temperature (P-T) limit curves for heatup and cooldown. The RV integrity program ensures that the time-dependent parameters used in the TLAA evaluations will remain valid throughout the license renewal period.

[Loss of Material] Loss of material is an aging effect requiring management for the period of extended operation. The aging mechanisms that can cause loss of material for RVs are general corrosion, mechanical wear, fretting wear, and aggressive chemical attack.

General corrosion has caused leakage of CRDM canopy seal welds. Canopy seal weld leaks are effectively managed through a combination of system pressure tests, performed in accordance with the requirements of the ASME Section XI, Subsections IWB, IWC, and IWD ISI program, and the boric acid wastage surveillance program. These programs provide assurance that the intended function(s) of these RV components will be maintained consistent with the CLB throughout the period of extended operation.

Loss of material due to wear is an aging effect requiring management for the reactor closure studs, stud holes, nuts and washers, and core support lugs. Examinations performed as part of the existing ASME Section XI, Subsections IWB, IWC, and IWD ISI program provide assurance that the intended function(s) of these RV components will be maintained consistent with the CLB throughout the period of extended operation.

Fretting wear is an aging mechanism that affects the bottom-mounted instrumentation thimble tubes. The evaluation performed for thimble tube thinning has been identified as a TLAA, and the staff's evaluation of this TLAA is provided in Section 4.7 of this SER. On the basis of that evaluation, thimble tube N-05 requires aging management in accordance with 10 CFR 54.21(c)(1)(iii). The thimble tube inspection program provides assurance that the intended function(s) of the RV bottom-mounted instrumentation thimble tubes will be maintained consistent with the CLB throughout the period of extended operation.

[Loss of Mechanical Closure Integrity] Loss of mechanical closure integrity can result from stress relaxation and/or aggressive chemical attack.

Loss of mechanical closure integrity due to stress relaxation is a relevant aging effect that requires management. This aging effect can be managed by periodic ISIs and leakage testing. The ASME Section XI, Subsections IWB, IWC, and IWD ISI program provides assurance that loss of mechanical closure integrity due to stress relaxation will be managed, and that the intended function(s) of the RVs will be maintained consistent with the CLB throughout the period of extended operation.

Loss of mechanical closure integrity due to aggressive chemical attack has been observed in the industry, and is the most common aging mechanism of concern for ferritic fasteners of stainless steel components. Mechanical closure bolting associated with the RVs is made of low alloy steel bolting material, and is subject to aggressive chemical attack from potential borated water leaks. The boric acid wastage surveillance program provides assurance that the aging mechanism of loss of mechanical closure integrity due to aggressive chemical attack will be managed, and the intended function(s) of the RVs will be maintained consistent with the CLB throughout the period of extended operation.

Industry Experience

The applicant performed a review of industry operating history and NRC generic communications to validate the set of aging effects that require management. Specifically, the applicant reviewed the following industry correspondence for the RV's operating experience:

- NRC Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors"
- NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants"
- NRC Generic Letter 92-01, "Reactor Vessel Structural Integrity"
- NRC Generic Letter 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations"

- NRC Information Notice 87-44, "Thimble Tube Thinning in Westinghouse Reactors"

- NRC Information Notice 96-32, "Implementation of 10 CFR 50.55a(g)(6)(ii)(A), 'Augmented Examination of Reactor Vessel'"

No aging effects requiring management were identified from the above documents beyond those already identified in Section 3.2.4.2 of the LRA.

Plant-Specific Experience

The applicant reviewed Turkey Point Unit 3 and 4 operating experience to validate the identified aging effects requiring management. This review included a survey of Turkey Point nonconformance reports, licensee event reports, and condition reports for any documented instances of RV component aging, in addition to interviews with responsible engineering personnel. Outside diameter initiated SCC of bottom-mounted instrumentation guide tubes and loss of material due to general corrosion of canopy seal welds has been experienced at Turkey Point. Accordingly, AMPs were identified, as discussed above, to manage these effects. No other aging effects requiring management were identified from this review beyond those identified in Section 3.2.4.2 of the LRA.

3.2.4.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.4 (including Table 3.2-1) and Appendix B to the LRA, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation for the RVs.

3.2.4.2.1 Aging Effects

The applicant states that the applicable aging effects include the following:

- cracking
- reduction in fracture toughness
- loss of material
- loss of mechanical closure integrity

On the basis of the description of the RV internal and external environments, materials used in the fabrication of various RV components, the Turkey Point experience, and the applicant's survey of industry and plant-specific experience, the NRC staff concludes that the applicant has identified the aging effects that are applicable for the RVs.

3.2.4.2.2 Aging Management Programs

As discussed above, the following existing AMPs will be continued during the period of extended operation:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- boric acid wastage surveillance program

- chemistry control program
- RV head Alloy 600 penetration inspection program
- RV integrity program
- thimble tube inspection program

The staff's review of the AMPs listed above may be found in Sections 3.9.1.1, 3.9.3, 3.1.1, 3.9.12, 3.9.13, and 3.9.16, respectively, of this SER.

The applicant indicates that VT-3 examinations will be used to detect cracking of the core support lugs. The staff did not believe that the VT-3 examinations were sufficient to detect cracking. Therefore, the staff requested that the applicant provide details of a plant-specific AMP to detect cracking of the core support lugs. In its April 19, 2001, response to the RAI, the applicant indicated that the Turkey Point ASME Section XI Subsections IWB, IWC, and IWD ISI program currently performs an enhanced VT-3 visual examination on the core support lugs. This enhanced visual examination employs the same resolution requirements as that required by ASME Section XI for VT-1 examinations. The applicant indicated that for the period of extended operation, the ASME Section XI Subsections IWB, IWC, and IWD ISI program will be enhanced to require ASME Section XI VT-1 examinations of the core support lugs. The staff found the applicant's response to be acceptable for detection of cracking of the core support lugs.

On the basis of the evaluations of these AMPs in the SER sections identified above, the staff concludes that these AMPs are acceptable for managing the pertinent aging effects and providing assurance that the intended function(s) of the RV components will be maintained consistent with the CLB throughout the period of extended operation.

3.2.4.3 Conclusions

The staff has reviewed the information in Section 3.2.4, "Reactor Vessels," and Appendices A and B to the LRA, as supplemented by the April 19, 2001, response to the RAI. The staff concludes that the applicant has demonstrated that the effects of aging associated with the RVs will be adequately managed such that there is reasonable assurance that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation.

3.2.5 Reactor Vessel Internals

3.2.5.1 Summary of Technical Information in the Application

The applicant described its AMR of the RV internals for license renewal in LRA Section 3.2.5, "Reactor Vessel Internals," as supplemented by the April 19, 2001, response to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the RV internals will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

The components that comprise the RV internals and are within the scope of license renewal and therefore, subject to an AMR are listed in Table 3.2-1 of the LRA, along with their identified intended functions, materials, and environmental exposures.

The Westinghouse Owners Group topical report WCAP-14577 is not incorporated by reference in the LRA. However, the application states that the RV internals are bounded by the description in the topical report with regard to design criteria and features, modes of operation, intended functions, and environmental exposures. The Turkey Point RV internals are constructed of stainless steel, Alloy 600, and Alloy X-750, and the materials, fabrication techniques and installed configuration are consistent with the respective components contained in the topical report.

The LRA indicates that fatigue is the only TLAA that applies to RV internals, as addressed in Section 4.3.1 of the LRA.

The following RV internals aging effects require management during the extended period of operation:

- cracking
- reduction in fracture toughness
- loss of material
- loss of mechanical closure integrity
- loss of preload
- dimensional change

The programs and activities that manage the aging effects for each applicable environment and material combination are listed in Table 3.2-1 of the LRA.

Each of the aging effects requiring management is described in the LRA with regard to RV internals component affectations and the proposed AMPs. The following AMPs are identified in the LRA:

- ASME Section XI, Subsection IWB, IWC, and IWD ISI program
- chemistry control program
- reactor vessel internals inspection program

The latter is a new program developed for the license renewal period, and the other two are existing programs.

The LRA provides a summary of the industry and plant-specific operating experience that the applicant reviewed to validate the set of aging effects that require management. On the basis of the review of the identified operating experience, the licensee did not identify any additional aging effects requiring management for the extended period of operation beyond those listed in Table 3.2-1 of the LRA.

On the basis of the evaluations provided in Appendix B to the LRA for the programs identified, the applicant concluded that aging effects will be adequately managed so that the intended functions of the RV internals components listed in Table 3.2-1 of the LRA will be maintained consistent with the CLB throughout the period of extended operation.

3.2.5.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.1 (including Table 3.2-1) and pertinent sections of Appendix B to the LRA, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation for the RV internals.

The staff has reviewed the RV internals technical information provided in Section 3.2.5 of the LRA for Turkey Point, Units 3 and 4. The staff requested additional information needed to complete its review and prepare an SE based on the RAI responses and the balance of the technical information provide in Section 3.2.5 of the LRA. The applicant subsequently met with the staff twice to provide additional information and clarifications prior to forwarding its response to the RAI.

Action Items from Previous Staff Evaluation of WCAP-14577

As described in Section 3.2.5.1 of this SER, the final SER for WCAP-14577, "License Renewal Evaluation: Aging Management Evaluation for Reactor Internals," was issued by letter dated February 10, 2001, after the Turkey Point LRA was submitted to the NRC for review. In response to RAI 3.2.5-4, by letter dated April 19, 2001, the applicant provided a response to the applicant action items in the final SER for WCAP-14577. As discussed below, the staff finds that the applicant's responses resolve the applicant action items from the final SER for WCAP-14577:

Applicant Action Item 1:

To ensure applicability of the results and conclusions of WCAP-14577 to the applicant's plant(s), the license renewal applicant is to verify that the critical parameters for the plant are bounded by the topical report. Further, the renewal applicant must commit to programs described as necessary in the topical report to manage the effects of aging during the period of extended operation on the functionality of the RV components. Applicants for license renewal will be responsible for describing any such commitments and proposing the appropriate regulatory controls. Any deviations from the AMPs described in this topical report as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the RV internal components or other information presented in the report, such as materials of construction, must be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).

Response: LRA Subsections 2.3.1.6 (page 2.3-10) and 3.2.5 (page 3.2-29) provide a summary of the comparison of the critical parameters and attributes of Turkey Point to WCAP-14577 and describe the WCAP applicability to Turkey Point.

Applicant Action Item 2:

A summary description of the programs and activities for managing the effects of aging and the evaluation of TLAAs must be provided in the license renewal FSAR supplement in accordance with 10 CFR 54.21(d).

Response: Programs necessary to manage the effects of aging for the Turkey Point RV internals are the RV internals inspection program, the ASME Section XI, Subsection IWB, IWC, and IWD ISI program, and the chemistry control program. Summary descriptions of these programs are provided in the LRA FSAR Supplement, Appendix A, Subsections 16.1.6 (page A-34), 16.2.1 (page A-34), and 16.2.4 (page A-36), respectively. As stated in LRA Subsection 3.2.5 (page 3.2-29), the only TLAA applicable to the Turkey Point RV internals is fatigue. A summary description of the fatigue TLAA evaluation is provided in the LRA FSAR Supplement, Appendix A, Subsection 16.3.2 (page A-44).

Applicant Action Item 3:

For the holddown spring, applicants for license renewal are expected to address intended function, AMR, and appropriate AMP(s).

Response: The information on the holddown springs is provided in LRA Subsection 3.2-5 (pages 3.2-29 through 3.2-36) and in Table 3.2-1 (page 3.2-78).

Applicant Action Item 4:

The license renewal applicant must address AMR, and appropriate AMP(s), for guide tube support pins.

Response: The information on the guide tube support pins is provided in LRA Subsection 3.2-5 (pages 3.2-29 through 3.2-36) and in Table 3.2-1 (page 3.2-77).

Applicant Action Item 5:

The license renewal applicant must explicitly identify the materials of fabrication of each of the components within the scope of the topical report. The applicable aging effect should be reviewed for each component based on the materials of fabrication and the environment.

Response: Upon further review of the plant-specific RV internals materials and environments, FPL has identified the following:

- The lower support castings identified in LRA Table 3.2-1 (page 3.2-78) are forgings.
- The bottom-mounted instrumentation columns identified in LRA Table 3.2-1 (page 3.2-76) are cast stainless steel.
- The lower support columns identified in LRA Table 3.2-1 (page 3.2-76) are cast stainless steel.
- The upper support column bases (new line item for LRA Table 3.2-1 on page 3.2-77) are cast stainless steel, but not exposed to a fluence greater than 10^{21} n/cm^2.
- The lower support forgings will be exposed to a fluence in excess of 10^{21} n/cm^2, as discussed in the response to RAI 3.2.5-1.

With the exception of the changes discussed above, the specific materials of fabrication and environments for all parts of the Turkey Point RV internals that require AMR are identified in LRA Subsection 3.2.5.1 (page 3.2-30) and in Table 3.2-1 (pages 3.2-76 through 3.2-79). Changes to Table 3.2-1 as a result of the above are included in the following tables. *[NOTE: The revisions to Table 3.2-1 are not duplicated here - see letter dated April 19, 2001.]*

Applicant Action Item 6:

The license renewal applicant must describe its aging management plans for loss of fracture toughness in cast austenitic stainless steel reactor vessel internals (RVI) components, considering the synergistic effects of thermal aging and neutron irradiation embrittlement in reducing the fracture toughness of these components.

Response: Considering the response to item (5) above, the only CASS RV internals components within the scope of license renewal are the lower support columns, the bottom-mounted instrumentation columns, and the upper support column bases. Of these components, only the lower support columns will be subjected to fluences of greater than 10^{21} n/cm^2. Accordingly, synergistic effects of thermal aging and irradiation embrittlement in reducing the fracture toughness will be a consideration for the lower support columns. As noted in item (5) above and in LRA Table 3.2-1 (pages 3.2-76 through 3.2-79), reduction in fracture toughness will be managed by the RV internals inspection program, as described in LRA Appendix B, Subsection 3.1.6 (page B-21).

Applicant Action Item 7:

The license renewal applicant must describe its aging management plans for void swelling during the license renewal period.

Response: Aging management plans regarding dimensional change due to void swelling of the Turkey Point RV internals are discussed in LRA Subsection 3.2.5.2.6 (page 3.2-33). These plans are included in the RV internals inspection program, which is described in LRA Appendix B, Subsection 3.1.6 (page B-21).

Applicant Action Item 8:

Applicants for license renewal must describe how each plant-specific AMP addresses the following elements: (1) scope of the program, (2) preventive actions, (3) parameters monitored or inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.

Response: The programs necessary to manage the effects of aging of the Turkey Point RV internals are the RV internals inspection program, the ASME Section XI, Subsection IWB, IWC, and IWD ISI program, and the chemistry control program. The descriptions of these programs, provided in LRA Appendix B, Subsections 3.1.6 (page B-21), 3.2.1.1 (page B-27), and 3.2.4 (page B-47), respectively, address the 10 elements identified. Two elements, corrective action and administrative controls, are common to all programs and are described in LRA Appendix B Section 2.0 (page B-5).

Applicant Action Item 9:

The license renewal applicant must address plant-specific plans for management of cracking (and loss of fracture toughness) of RVI components, including any plans for augmented inspection activities.

Response: Aging management plans to address cracking and reduction in fracture toughness of the Turkey Point RV internals are discussed in LRA Subsections 3.2.5.2.1 (page 3.2-30) and 3.2.5.2.2 (page 3.2-31), respectively. The programs necessary to manage cracking and reduction in fracture toughness are the RV internals inspection program, the ASME Section XI, Subsection IWB, IWC, and IWD ISI program, and the chemistry control program. The descriptions of these programs are provided in LRA Appendix B, Subsections 3.1.6 (page B-21), 3.2.1.1 (page B-27), and 3.2.4 (page B-47), respectively. The RV internals inspection program includes inspection activities for cracking and reduction in fracture toughness.

Applicant Action Item 10:

The license renewal applicant must address plant-specific plans for management of age-related degradation of baffle/former and barrel/former bolting, including any plans for augmented inspection activities.

Response: Aging management plans to address loss of mechanical closure integrity of the Turkey Point baffle/former and barrel/former bolting are discussed in LRA Subsection 3.2.5.2.4 (page 3.2-33). Note that these plans also consider information provided in WCAP-14577, Revision 1, "License Renewal Evaluation: Aging Management for Reactor Internals," submitted to the NRC by the WOG on October 9, 2000. The program necessary to manage loss of mechanical closure integrity of this bolting is the RV internals inspection program. The description of this program is provided in LRA Appendix B, Subsection 3.1.6 (page B-21). The RV internals inspection program includes augmented inspection activities as they apply to loss of mechanical closure integrity of the baffle/former and barrel/former bolting.

Applicant Action Item 11:

The license renewal applicant must address the TLAA of fatigue on a plant-specific basis.

Response: A description of the plant-specific fatigue TLAA evaluation performed for Turkey Point is provided in LRA Section 4.3 (pages 4.3-1 through 4.3-13). Also, refer to response to RAI 3.2.5-7.

The following summarizes the February 2, 2001, RAIs and the information, clarification, and April 19, 2001, responses provided by the applicant with regard to Section 3.2.5:

1) In Section 3.2.5 of the LRA, the applicant states that the RV internals components for Turkey Point, Units 3 and 4, are bounded by the description in topical report WCAP-14577, with regard to their intended functions and within the scope of license renewal, as discussed in Subsection 2.3.1.6 of the LRA. However, this raised a potential contradiction between this information and other renewal application text with regard to the holddown ring having an intended function. Contrary to the staff's position in its final SER, topical report WCAP-14577, Rev. 1, indicates that the holddown ring does not have an intended core support function. The staff requested that the LRA include the holddown ring in the discussion in Section 2.3.1.6, which lists the components that comprise the RV internals, or provide the basis for its exclusion.

   During the initial RAI followup meeting with the staff, the applicant provided a clarification, stating that the applicant does not agree with the topical report on this issue, and included the holddown ring in Table 3.2-1 of the LRA as having a core support intended function. The staff withdrew the RAI question.

2) In Section 3.2.5 of the LRA, the applicant indicates that the Turkey Point RV internals components with fluence greater than 10^{21} n/cm^2 do not include the lower support casting. In RAI 3.2.5-1, the staff requested that the applicant provide the maximum fluence expected for the lower support casting during the license renewal period and the basis for that expectation.

   In the RAI 3.2.5-1 followup discussions and response, FPL indicated that the lower support casting was subsequently identified as a forging, and will likely be exposed to a fluence greater than 10^{21} n/cm^2 at the end of the extended period of operation. This is expected to produce some reduction in fracture toughness, as well as increased susceptibility to irradiation-assisted SCC. The LRA will be revised to include the lower support forging in the list of components that are potentially susceptible to reduction in fracture toughness due to irradiation embrittlement. The LRA will also be revised to indicate that the only cast austenitic stainless steel components in the RV internals are the lower support columns, the bottom-mounted instrumentation columns, and the upper support column bases.

3) The RV internals baffle assembly contains three categories of baffle bolts that are designated as former/baffle bolts, barrel former/bolts and baffle/baffle bolts. In RAI 3.2.5-2, the staff requested that the applicant clarify or provide the basis for not including the baffle/baffle bolts in the baffle assembly bolting described in Sections 3.2.5.2.2 and 3.2.5.2.4 and Table 3.2-1 of the LRA.

   In the response to RAI 3.2.5-2, the applicant indicated that the Turkey Point baffle assembly baffle/baffle bolts (baffle plate edge bolts) perform no structural function and are not required to perform an intended function. The WOG developed a methodology as part of the baffle bolt cracking inspection program to evaluate acceptable baffle assembly bolting patterns under faulted conditions. Applications of this methodology have identified acceptable bolting patterns without taking credit for baffle/baffle bolts.

4) In Section 3.2.5.2.1 of the LRA, the applicant indicates that susceptibility has been observed at fluence as low as $1x10^{21}$ n/cm^2 in laboratory studies on Type 304 stainless steel in PWR environments. Further, the applicant indicates that Type 316 stainless steel is less susceptible, and that field information suggests that greater exposures are required for the development of susceptibility. In RAI 3.2.5-3, the staff requested that the applicant identify the field information that suggests that greater exposures are required for the development of susceptibility.

   In its response to RAI 3.2.5-3, the applicant identified the field information resources that it referred to in Section 3.2.5.2.1, as material contained in four proceedings of symposiums and conferences that occurred prior to 1998. The response also provided some new limited fluence information on Type 316 and 347 stainless steel bolts obtained during baffle bolt cracking inspections conducted on four WOG plants in 1999.

5) In Section 3.2.5.2.4 of the LRA, the applicant states that significant data, information, and industry experience relative to the aging of baffle bolting is provided in WCAP-14577 and is not duplicated in the LRA. In RAI 3.2.5-4, the staff requested that the applicant review the staff RAIs, the associated owners group responses, and address the applicability and need for inclusion with regard to the Turkey Point Unit 3 and 4 LRA. The staff also requested that the applicant provide responses to the renewal applicant action items provided in the final SER for WCAP-14577.

   In the RAI 3.2.5-4 response, the applicant indicated that it reviewed and addressed the NRC topical report WCAP-14577 RAIs and associated WOG responses in the Turkey Point AMR performed on the RV internals. The applicant identified applicable information included in the Turkey Point LRA that addressed these RAIs and their responses, including References 2.3-9 on page 2.3-43 and 3.2-8 on page 3.2-53 of the LRA. The applicant also provided response to the Renewal Applicant Action Item for WCAP-14577, as previously described in this section.

6) The response to Action Item (6) to RAI 3.2.5-4 addresses the staff's concern regarding the applicant's LRA reference to WCAP-14577, Revision 0, dated June 1997, as the source for significant data, information, and industry experience relative to the aging of baffle bolting, in lieu of WCAP-14577, Revision 1, dated October 2000. The staff is concerned with the use of the earlier topical report revision for aging management plans to address loss of mechanical closure of baffle former bolting, because Revision 0 provides limited and dated domestic plant baffle bolting degradation experience. This version indicates that there have been no historical incidents that involve baffle/former bolting degradation in domestic plants. By contrast, Revision 1 provides significant data, information, and industry experience relative to the aging of baffle bolting in domestic plants that was developed during 1998 through mid-2000. The Action Item (6) response indicated that aging management plans to address the loss of mechanical closure of Turkey Point baffle/former and barrel/ former bolting are discussed in LRA Section 3.2.5.2.4 (page 3.2-33), and noted that these plans also consider the information provided in WCAP-14577, Revision 1, dated October 2000. Based on this information contained in the response to RAI 3.2.5-4, the applicant has committed to revise the reference to WCAP-14577 Revision 0 to specify WCAP-14577 Revision 1, which contains the significant data, information, and industry experience relative to the aging of baffle bolting that is addressed in Subsection 3.2.5.2.4.

7) In Section 3.2.5.2.6 of the LRA, the applicant discusses the RV internals material dimensional changes and cites references indicating that the material may be subject to various levels of dimensional changes resulting from void swelling under certain conditions. One reference cited in the discussion concludes that at the approximate RV internal end-of-life dose of 100 displacements per atom, swelling would be less than 2% at irradiation temperatures between 572 °F and 752 °F. In the discussion, the LRA indicates that field service experience in PWR plants has not shown any evidence of swelling and, at present, there have been no indications from the different RV internals bolt removal programs, or from any of the other inspection and functional evaluations (e.g., refueling), that there are any discernible adverse effects attributable to swelling. In RAI 3.2.5-5, the staff requested that the applicant identify some specific examples of field service experience, bolt removal programs, and other inspections and functional evaluations with detailed descriptions of the examinations, inspections, and evaluations that have been performed to support the conclusion that there is not any evidence of, or any discernible effects attributable to swelling. In RAI 3.2.5-5, the staff further requested that the applicant describe the change in loading on the baffle bolt, and its impact on the bolt integrity that would occur if the thickness of the baffle material located under the bolt head were subjected to a 2% or less dimensional change due to swelling.

In its response to RAI 3.2.5-5, the applicant reported that field service material swelling experience is derived from refueling outages and ISIs performed on industry plants since their startup. The absence of gap closures and physical distortion caused by localized dimensional increases is indicative of the absence of significant material swelling. Data on swelling are currently being evaluated as part of the industry's baffle bolt cracking evaluation program. Several bolts removed from Westinghouse plants during the 1999 baffle bolt cracking inspections were subject to detailed hot-cell micrographics examination, and some void swelling formations were observed. The measured volumetric changes were less than 0.03 percent. The applicant also obtained the following information from F.A. Garner to clarify the question of bolt integrity when subject to loading resulting from a 2% swelling of baffle plate material under the bolt head:

The stresses developed by void formation will be limited by irradiation creep. Void swelling and irradiation creep have an interrelated relationship to the local stress state. Irradiation creep exists prior to the onset of swelling, and will relieve any applied or thermally induced stresses. Once swelling begins, a new much larger component of creep develops that is directly proportional to the instantaneous swelling rate. Therefore, any swelling-induced stress will be relaxed at a rate proportional to the swelling rate. This leads to a maximum stress well below 200 MPA, regardless of the local swelling rate. The yield stress can never be exceeded for a typical bolt application. The stress is maintained as long as the swelling rate difference is minimal.

In the RAI 3.2.5-5 response, the applicant concluded that the field service experience, and hot-cell evaluations indicate that the localized swelling is much less than 2%, and reasonable extrapolations to the end of life suggest that it will remain small. In LRA Table 3.2-1, the applicant indicates that the RV internals components requiring management for dimensional changes due to void swelling have yet to be determined. In its April 19, 2001, response to RAI 3.8.6-1, the applicant indicated that the EPRI Materials Reliability Project (MRP) has a task underway to issue a "white paper" on void swelling that will include

available data and effects on RV internals. The applicant committed to evaluate these results and factor them into the RV internals inspection program.

8) The LRA uses 1 x 10^{21} n/cm^2 (E>0.1 MeV) as a fluence threshold for neutron embrittlement of stainless steel used in RV components. In RAI 3.2.5-6, the staff requested that the applicant provide data to support this position, or revise the LRA to expand the list of potentially susceptible components to include those at lower fluences.

   In its response to RAI 3.2.5-6, the applicant provided data generally at higher irradiation temperatures than those that apply to RV internals components. The staff does not agree with the applicant's conclusion regarding a fluence threshold for neutron embrittlement of stainless steel used in RV components. However, the applicant's approach to managing neutron embrittlement of RV internals components (as described in Section 3.1.6 of the LRA) does provide adequate management of this degradation mechanism. The staff's evaluation of this program is provided in Section 3.8.6 of the SER.

9) In Section 3.2.5 of the LRA, the applicant states that, "Turkey Point's TLAA identification effort also identified fatigue as the only TLAA applicable to the RV internals. Fatigue of the RV internals is addressed in Subsection 4.3.1." In RAI 3.2.5-7, the staff requested that the applicant provide a list of the TLAAs associated with fatigue used in verifying that the structural integrity of the RV internals were evaluated and determined to remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i).

   In the RAI 3.2.5-7 followup discussions and response, the applicant indicated that an extensive review of the Turkey Point CLB was performed to identify TLAAs requiring evaluation for license renewal. Their review is documented in a detailed engineering evaluation that includes a description of the TLAA identification process, evaluation results, and summary tables. This evaluation is available on site for NRC review. A fatigue evaluation was performed on the Turkey Point RV internals in support of the thermal power uprate of the units in the mid-1990s (Turkey Point Units 3 and 4 Operating License Amendment 191/185, issued September 25, 1996). Further, the applicant indicated that the existing 40-year design cycles and cycle frequencies were determined to be conservative and bounding for the period of extended operation.

3.2.5.2.1 Aging Effects

The applicant identifies the following aging effects for the RV internals:

- cracking
- reduction in fracture toughness
- loss of material
- loss of mechanical closure integrity
- loss of preload
- dimensional change

Based on the description of the internal and external environments, materials used, and the applicant's review of industry and plant-specific experience, the NRC staff concludes that the applicant has identified the aging effects that are applicable for the RV internals.

3.2.5.2.2 Aging Management Programs

The applicant identifies existing and new programs for managing aging effects for the RV internals during the license renewal term. Specifically, the LRA identifies the following existing AMPs:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- chemistry control program

Staff evaluations of these existing programs are provided in Sections 3.9.1.1 and 3.1.1 of this SER.

A new AMP identified in the application is RV internals inspection program. Staff evaluation of this new AMP is provided in Section 3.8.6 of this SER.

On the basis of the evaluations of these AMPs in the SER sections identified above, the staff concludes that these AMPs are acceptable for managing the pertinent aging effects and providing assurance that the intended function(s) of the RV internals components will be maintained consistent with the CLB throughout the period of extended operation.

3.2.5.3 FSAR Supplement

The only FSAR supplement section pertinent to the RV internals relates to the RV internals inspection program. This program and its related FSAR supplement are evaluated in Section 3.8.6 of this SER.

3.2.5.4 Conclusion

The staff has reviewed the information in LRA Section 3.2.5, " Reactor Vessel Internals," as supplemented by the April 19, 2001, responses to the RAI. The staff concludes that the applicant has demonstrated that the effects of aging associated with the RV internals will be adequately managed such that there is reasonable assurance that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation.

3.2.6 Reactor Coolant Pumps

Each of the three reactor coolant loops for Turkey Point, Units 3 and 4, contains a vertically mounted, single-stage centrifugal reactor coolant pump (RCP) that employs a controlled leakage seal assembly. The RCPs provide the motive force for circulating the reactor coolant through the reactor core, piping, and steam generators. The RCPs used at Turkey Point are Westinghouse Model 93.

3.2.6.1 Summary of Technical Information in the Application

The applicant describes its AMR of the RCPs for license renewal in LRA Section 3.2.6, "Reactor Coolant Pumps," as supplemented by the April 19, 2001, response to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the RCPs will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

In Section 2.3.1.7 of the LRA, the applicant states that the intended function of the RCPs for license renewal is to maintain reactor coolant system pressure boundary integrity. The RCP components that support this intended function and are subject to an AMR include the pump casing, cover, pressure-retaining bolting, and integral thermal barrier heat exchanger. Non-Class 1 piping, instrumentation, and other components attached to the RCPs are addressed in Section 2.3.1.2.2 of the LRA.

The RCP is included in WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components." WCAP-14575 is not incorporated by reference in the LRA, but the Turkey Point AMR was compared to WCAP-14575 with the results presented below. The draft safety evaluation for WCAP-14575 was issued by letter dated February 10, 2000. The final safety evaluation for WCAP-14575 was issued by letter dated November 8, 2000, after the Turkey Point LRA was submitted to the NRC for review. However, all of the renewal applicant action items that are in the final safety evaluation are addressed either as applicant action items or open items in Tables 2.3-2 and 2.3-3 of the LRA. Specifically, the open items that were identified in the draft safety evaluation were either resolved or added to the list of renewal applicant action items for the final safety evaluation. The applicant's responses are discussed in Section 3.2.6.2 of this SER.

The design and operation of the RCPs were reviewed using the process described in Section 2.3.1.1.1 of the LRA. This review confirmed that the Turkey Point Unit 3 and 4 RCPs are bounded by the description contained in WCAP-14575, with regard to design criteria and features, materials of construction, fabrication techniques, installed configuration, modes of operation, and environments/exposures. The component intended functions for the RCPs are consistent with the intended functions identified in WCAP-14575. The applicant has determined that cracking due to stress corrosion and loss of mechanical closure integrity due to aggressive chemical attack are additional aging effects, not included in WCAP-14575, that require management during the license renewal term.

CASS Class 1 components at Turkey Point consist of the reactor coolant primary loop elbows, RCP casings and closure flanges, and selected valves exceeding a temperature threshold criterion of 482 °F. Reduction in fracture toughness of the reactor coolant CASS primary loop elbows and valves is discussed in Section 3.2.1 of the LRA.

Aging Effects

RCPs are exposed to an internal environment of treated water-primary, and external environments of containment air and potential borated water leaks. The integral thermal barrier heat exchangers are exposed to an internal environment of treated water and treated water-primary, and an external environment of containment air and potential borated water leaks (see Tables 3.0-1 and 3.0-2 of the LRA).

The RCP and integral thermal barrier heat exchanger components are constructed of stainless steel and low alloy steel. The RCP and integral thermal barrier heat exchanger components, intended functions, materials of construction, and environments are summarized in Table 3.2-1 of the LRA.

In Section 3.2.6 of the LRA, the applicant identified the following aging effects for the components of the three RCPs that are subject to an AMR:

- SCC
- reduction in fracture toughness of CASS items due to thermal aging embrittlement
- loss of material due to MIC
- loss of mechanical closure integrity (by stress relaxation and/or aggressive chemical attack)
- fouling

Cracking due to fatigue is identified as a TLAA and is addressed in Sections 4.3.1 and 4.3.4. of the LRA.

In Section 3.2.6.2.1 of the LRA, the applicant states that specific design, fabrication, and construction measures were taken to minimize or eliminate material susceptible to SCC in the RCPs. In addition, to reduce the susceptibility of RCP materials to SCC, Turkey Point prevents sensitized stainless steels from coming in contact with an aggressive environment.

In Section 3.2.6.2.2 of the LRA, the applicant states that the only RCP components subject to reduction in fracture toughness due to thermal embrittlement are austenitic stainless steel castings. Consistent with the conclusions drawn in the NRC final SER for WCAP-14575, the applicant stated that CASS RCP casings and closure flanges do not require an AMP to manage thermal embrittlement beyond the examinations programmatically required by ASME Section XI as modified by Code Case N-481.

Section 3.2.6.2.3 of the LRA identifies MIC as an aging mechanism that can cause loss of material for the RCP integral thermal barrier heat exchanger.

In Section 3.2.6.2.4 of the LRA, the applicant states that loss of mechanical closure integrity can result from stress relaxation and/or aggressive chemical attack. In addition, the applicant states that loss of mechanical closure integrity due to aggressive chemical attack has been observed in the industry and is the most common aging mechanism of concern for ferritic fasteners of stainless steel components.

In Section 3.2.6.2.5 of the LRA, the applicant states that aging mechanisms that can result in fouling of the RCP integral thermal barrier heat exchanger tubing include biological fouling and particulate fouling. Biological fouling has been identified as an aging effect for tubes exposed to CCW. Particulate fouling has been identified as an aging effect for heat transfer surfaces of the RCP integral thermal barrier heat exchangers.

Industry Experience

The applicant performed a review of industry operating history and a review of NRC generic communications to validate the set of aging effects that require management. The industry correspondence that was reviewed for RCP operating experience includes the following:

- NRC Bulletin 79-17, "Pipe Cracks in Stagnant Borated Water Systems at PWR Plants"
- NRC Circular 76-06, "Stress Corrosion Cracks in Stagnant, Low-Pressure Stainless Piping Containing Boric Acid Solution at PWRs"
- NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants"
- NRC Information Notice 79-19, "Pipe Cracks in Stagnant Borated Water Systems at PWR Plants"

- NRC Information Notice 86-108, "Degradation of Reactor Coolant System Pressure Boundary Resulting From Boric Acid Corrosion"
- NRC Information Notice 92-86, "Unexpected Restriction to Thermal Growth of Reactor Coolant Piping"
- NRC Information Notice 93-61, "Excessive Reactor Coolant Leakage Following a Seal Failure in a Reactor Coolant Pump or Reactor Recirculation Pump"
- NRC Information Notice 93-84, "Determination of Westinghouse Reactor Coolant Pump Seal Failure"
- NRC Information Notice 93-90, "Unisolatable Reactor Coolant System Leak Following Repeated Application of Leak Sealant"
- NRC Information Notice 97-31, "Failures of Reactor Coolant Pump Thermal Barriers and Check Valves in Foreign Plants"

No aging effects requiring management were identified from the above documents beyond those already identified in section 3.2.6.2 of the LRA. Note that a summary of industry experience associated with RCPs is provided in WCAP-14575.

Plant-Specific Experience

The applicant reviewed Turkey Point Unit 3 and 4 operating experience to validate the identified aging effects requiring management. This review included a survey of Turkey Point non-conformance reports, licensee event reports, and condition reports for any documented instances of RCP component aging, in addition to interviews with responsible engineering personnel. No aging effects requiring management were identified from this review beyond those identified in Section 3.2.6.2.

Aging Management Programs

In Section 3.2.6.4 of the LRA, the applicant identifies the following existing AMPs for the RCPs:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- boric acid wastage surveillance program
- chemistry control program

The applicant concludes that these programs will manage the applicable aging effects so that the intended function(s) of the components of the RCPs will be maintained consistent with the CLB, under all design loading conditions throughout the period of extended operation.

3.2.6.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Sections 3.2.6 (including Table 3.2-1), and pertinent sections of Appendix B of the Turkey Point Units 3 and 4 LRA, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function would be maintained consistent with the CLB throughout the period of extended operation for the RCPs.

As mentioned in Section 3.2.6.1 of this report, the final SER for WCAP-14575, "License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components," was issued by letter dated November 8, 2000, after the

Turkey Point LRA was submitted to the NRC for review. However, all of the open items that were identified in the draft safety evaluation were either resolved, or added to the list of renewal applicant action items for the final safety evaluation. Therefore, the applicant addressed all renewal applicant action items that are included in the final safety evaluation report for WCAP-14575. There were six renewal applicant action items, and six open items from the draft safety evaluation for WCAP-14575. The action items, open items, applicant's responses, and staff's evaluations are given below.

Action Items From Previous Staff Evaluation of WCAP-14575

As discussed below, the staff finds that the applicant's responses (Tables 2.3-2 and 2.3-3 of the LRA) to the renewal applicant action items and open item from the draft safety evaluation resolve the 10 action items in the final safety evaluation for WCAP-14575.

Applicant Action Item 1: The license renewal applicant is to verify that its plant is bounded by the technical report. Further, the renewal applicant is to commit to programs described as necessary in the technical report to manage the effects of aging during the period of extended operation on the functionality of the reactor coolant system piping. Applicants for license renewal will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the AMPs within this technical report described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the reactor coolant system piping and associated pressure boundary components or other information presented in the report, such as materials of construction, will have to be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).

Response: As summarized in sections 2.3.1.2 and 2.3.1.7 of the LRA, the Turkey Point Unit 3 and 4 Class 1 piping and RCPs are bounded by the topical report with regard to design criteria and features, materials of construction, fabrication techniques, installed configuration, modes of operation, and environments/exposures. Programs necessary to manage the effects of aging are described in Sections 3.2.1 and 3.2.6 of the LRA, and are summarized in Table 3.2-1 of the LRA. Program commitments to manage the effects of aging for Class 1 piping and RCPs are described in Appendix B to the LRA and are summarized in the proposed UFSAR supplement provided in Appendix A to the LRA. Deviations from the AMPs included in the topical report are described in Sections 3.2.1 and 3.2.6 of the LRA. The staff found this response to be acceptable.

Applicant Action Item 2: Summary description of the programs and evaluation of TLAAs are to be provided in the license renewal FSAR supplement in accordance with 10 CFR 54.21(d).

Response: A summary of the programs identified to manage the effects of aging for Class 1 piping and RCPs is included in the proposed UFSAR supplement in Appendix A to the LRA. A markup of the UFSAR sections affected by the TLAA evaluations is also included in the proposed UFSAR supplement. The staff found this response to be acceptable.

Applicant Action Item 3: Applicants must provide a description of all insulation used on austenitic stainless steel nuclear steam supply system (NSSS) piping to ensure the piping is not susceptible to stress-corrosion cracking from halogens.

Response: During construction, the Class 1 piping was insulated in accordance with the applicable Westinghouse equipment specification. The specification listed specific trade names that were approved, by Westinghouse, for use on austenitic stainless steel. As described in the Turkey Point UFSAR, Section 4.2.5 "...external corrosion resistant surfaces in the reactor coolant system are insulated with low halide or halide free insulating material..." During 1979 the insulation on the reactor coolant piping was changed to reflective insulation. The insulation is made of austenitic stainless steel. Any non-metallics comply with NRC Regulatory Guide 1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel," dated October 1973. Subsequent additions of insulation were done in accordance with the applicable Bechtel specification, which also imposes the requirements of Regulatory Guide 1.36. Since all the insulation that was used on the reactor coolant piping is low halide or halide free, the piping is not susceptible to SCC initiated by such halides. The staff found this response to be acceptable.

Applicant Action Item 4: The license renewal applicant should describe how each plant-specific AMP addresses the following 10 elements: (1) scope of the program, (2) preventive actions, (3) parameters monitored or inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8)confirmation process, (9) administrative controls, and (10) operating experience.

Response: Programs necessary to manage the effects of aging for Class 1 piping and RCPs address the 10 elements identified. These programs are described in Appendix B of the LRA. The staff found this response to be acceptable.

Applicant Action Item 5: The license renewal applicant should perform additional fatigue evaluations or propose an AMP to address the components labeled I-M and I-RA in Tables 3-2 through 3-16 of WCAP 14575.

Response: The applicant has performed a plant-specific fatigue evaluation for Turkey Point Unit 3 and 4 Class 1 piping and RCPs. This evaluation is included in Section 4.3. The staff found this response to be acceptable.

Applicant Action Item 6: The staff recommendation for the closure of Generic Safety Issue (GSI)-190, "Fatigue Evaluation of Metal Components for 60-Year Plant Life" is contained in a memorandum from Ashok Thadani to William Travers, dated December 26, 1999. The license renewal applicant should address the effects of the coolant environment on component fatigue life as AMPs are formulated in support of license renewal. The evaluation of a sample of components with high-fatigue usage factors using the latest available environmental fatigue data is an acceptable method to address the effects of the coolant environment on component fatigue life.

Response: The applicant has performed a plant-specific evaluation for Turkey Point Unit 3 and 4 Class 1 piping and RCPs with regard to environmental effects on fatigue. This evaluation is included in Section 4.3.5.

The following six items were open items in the draft safety evaluation for WCAP-14575:

Item 1: WOG should complete the specific revisions to the subject topical report that it has committed to perform in response to the staff's requests for additional information discussed

in Section 3.1 of the safety evaluation. As described by WOG in its letter to the staff, dated July 19, 1999, these planned modifications are limited to Section 2.3.2.2, "Branch Line Restrictors," Section 2.3.2.4, "Thermal Barrier and RCP Seals," and the "summary" sections of the topical report.

Response: The Turkey Point Class 1 piping AMR includes branch line restrictors and their associated license renewal component intended function of throttling. The AMR of the Class 1 piping is addressed in section 3.2.1 and summarized in Table 3.2-1 of the LRA. The Turkey Point position regarding RCP seals is summarized in Section 2.3.1.7 of the LRA. The staff found this response to be acceptable.

Item 2: WOG should complete the updated review of generic communications and revise Section 3.1 of the topical report to describe the process used by the WOG to perform the review and to capture any additional items not identified by the original review.

Response: The applicant has completed an updated review of generic communications for applicability to Class 1 piping and RCPs. All generic communications applicable to aging effects are summarized in Sections 3.2.1 and 3.2.6 of the LRA. The staff found this response to be acceptable.

Item 3: The topical report indicates that thermal aging-related cracking of austenitic steel castings is an aging effect that the WOG considers potentially significant for the reactor coolant system piping and associated components. Thermal aging does not cause cracking; it causes a reduction in the fracture toughness of the material. The reduction in fracture toughness of the material results in a reduction in the critical flaw size that could lead to component failure. The WOG should revise the topical report, accordingly.

Response: The applicant's AMR methodology identifies reduction in fracture toughness as the aging effect related to thermal aging. Reduction in fracture toughness for Class 1 piping and RCPs is addressed in Sections 3.2.1 and 3.2.6 of the LRA. The staff found this response to be acceptable.

Item 4: Components that have delta ferrite levels below the susceptibility screening criteria have adequate fracture toughness and do not require supplemental inspection. As a result of thermal embrittlement, components that have delta ferrite levels exceeding the screening criterion may not have adequate fracture toughness and do require additional evaluation or examination. WOG should address thermal-aging issues in accordance with the staff's comments in Section 3.3.3 of this evaluation.

Response: As noted above for Item 3, reduction in fracture toughness for Class 1 piping and RCPs is addressed in Sections 3.2.1 and 3.2.6 of the LRA. The applicant's methodology is consistent with the staff's comments. The staff found this response to be acceptable.

Item 5: WOG should propose to perform additional inspection of small-bore reactor coolant system piping, that is, less than 4-inch-size piping, for license renewal to provide assurance that potential cracking of small-bore reactor coolant system piping is adequately managed during the period of extended operation.

Response: The AMR and specific program commitments for Class 1 small bore piping are addressed in Section 3.2.1 and summarized in Table 3.2-1 of the LRA. Specifically, the applicant committed to perform a one-time inspection in order to confirm that cracking is not occurring in small bore piping (less than 4 inches in diameter). The staff found this response to be acceptable.

Item 6: WOG should revise AMP-3.6 to include an assessment of the margin on loads in conformance with the staff guidance provided in Reference 11. In addition, AMP-3.6 should be revised to indicate if the CASS component is repaired or replaced per ASME Code, Section XI IWB-4000 or IWB-7000, then a new leak-before-break (LBB) analysis based on the material properties of the repaired or replaced component (and accounting for its thermal aging through the period of extended operation, as appropriate), is required to confirm the applicability of LBB. The inservice examination/flaw evaluation option is, per the basis on which the NRC staff has approved LBB in the past, insufficient to reestablish LBB approval. The original Turkey Point (LBB) analysis was performed consistent with the criteria specified in NUREG-1061, Volume 3, and utilized the modified limit load method as specified in the draft Standard Review Plan, Section 3.6.3. The NRC review and safety evaluation of the original Turkey Point LBB analysis is documented in the June 23, 1995, NRC letter to Florida Power and Light.

Response: The revised Turkey Point LBB analysis, which addresses the extended period of operation, utilizes a methodology consistent with the original LBB analysis. If Class 1 piping CASS components are repaired or replaced, Turkey Point design control procedures would require a new LBB analysis based on replacement material properties. The staff found this response to be acceptable.

3.2.6.2.1 Aging Effects

The applicant states that the applicable aging effects include the following:

- SCC
- reduction in fracture toughness of CASS items due to thermal aging embrittlement
- loss of material due to MIC
- loss of mechanical closure integrity (by stress relaxation and/or aggressive chemical attack)
- fouling

On the basis of the description of the RCP internal and external environments, materials used in the fabrication of various RCP components, the Turkey Point experience, and the applicant's survey of industry and plant-specific experience, the NRC staff concludes that the applicant has identified the aging effects that are applicable for the RCPs.

3.2.6.2.2 Aging Management Programs

The applicant identifies existing and new programs for management of aging effects for the RCPs during the license renewal term. The existing AMPs identified in the application are:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- boric acid wastage surveillance program
- chemistry control program

Staff evaluations of these existing programs are described in Sections 3.9.1, 3.9.3, and 3.1.1 of this SER, respectively.

On the basis of the evaluations of these AMPs in the SER sections described above, the staff concludes that these AMPs are acceptable in managing the pertinent aging effects and providing assurance that the intended function of the RCPs is maintained consistent with the CLB throughout the period of extended operation.

3.2.6.3 FSAR Supplement

On the basis of the staff's evaluation described above, the summary description for the RCPs described in Appendix A to the LRA is acceptable.

3.2.6.4 Conclusions

The staff has reviewed the information in Section 3.2.6, "Reactor Coolant Pumps," as supplemented by the April 19, 2001, response to RAI, and Appendices A and B to the LRA. The staff concludes that the applicant has demonstrated that the effects of aging associated with the RCPs will be adequately managed such that there is reasonable assurance that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation.

3.2.7 Steam Generators

Turkey Point, Units 3 and 4, each have three steam generators. One is installed in each reactor coolant loop. Each steam generator is a vertical shell and tube heat exchanger, which transfers heat from a single-phase fluid at high temperature and pressure (the reactor coolant) in the tube side, to a two-phase (steam-water) mixture at lower temperature and pressure in the shell side.

The reactor coolant enters and exits the tube side of each steam generator through nozzles located in the lower hemispherical head. The reactor coolant system fluid flows through inverted U-tubes connected to the tube sheet. The lower head is divided into inlet and outlet chambers by a vertical partition plate extending from the lower head to the tube sheet. The steam-water mixture is generated on the secondary, or shell side, and flows upward through moisture separators and dryers to the outlet nozzle at the top of the vessel, providing essentially dry, saturated steam. Manways are provided to permit access to both sides of the lower head and to the U-tubes and moisture separating equipment on the shell side of the steam generators.

3.2.7.1 Summary of Technical Information in the Application

The applicant described its AMR of the steam generators for license renewal in Section 3.2.7, "Steam Generators," of the LRA, as supplemented by the April 19, 2001, response to the RAI. The staff reviewed this section of the LRA to determine whether the applicant has demonstrated that the effects of aging on the steam generators will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The applicant identified steam generator components that are subject to an AMR in Table 3.2-1 of the LRA. These components include channel heads, primary inlet and outlet nozzles, primary inlet and outlet nozzle safe ends, tube sheets, U-tubes, divider plates, steam generator tube plugs, primary manways, upper and lower shells, elliptical heads, transition cones, feedwater and steam outlet nozzles, steam flow limiters, blowdown piping nozzles and secondary side shell penetrations, secondary closure covers, tube bundle wrappers, wrapper support systems, tube support plates, anti-vibration bars, support pads, seismic lugs, and primary and secondary bolting.

Intended Functions

The applicant determined the following intended functions to be applicable to the Turkey Point Unit 3 and 4 steam generators:

- maintain primary pressure boundary
- maintain secondary pressure boundary
- provide heat transfer from the primary fluid to the secondary fluid
- provide secondary side flow distribution and throttling
- provide structural support

Aging Effects

The steam generators are exposed to internal environments of treated water - primary and treated water - secondary, and external environments of containment air and potential borated water leaks. The steam generator components are constructed of stainless steel, carbon steel, alloy steel, Alloy 600, and Alloy 690. The steam generator components, their intended functions, the materials, and environments are summarized in Table 3.2-1 of the LRA.

Aging Management Programs

Aging effects for the steam generator components subject to an AMR, as given in the LRA, are the following:

- cracking
- loss of material
- loss of mechanical closure integrity

The aging effects requiring management are managed by the following programs:

- ASME Section XI, Subsections IWB, IWC, and IWD ISI program
- boric acid wastage surveillance program
- chemistry control program
- steam generator integrity program

Operating Experience

A review of industry operating history and a review of NRC generic communications were performed to validate the set of aging effects that require management. Turkey Point Unit 3 and 4 operating experience was also reviewed to validate the identified aging effects requiring

management. This review included a survey of Turkey Point non-conformance reports, licensee event reports, and condition reports for any documented instances of steam generator component aging, in addition to interviews with responsible engineering personnel.

The Turkey Point Unit 3 and 4 steam generators (with the exception of the channel heads and steam domes) were replaced in 1982 and 1983. This replacement was due to significant degradation of the original mill annealed Alloy 600 tubing and deterioration of the carbon steel support plates. Cracking of feedwater nozzles due to fatigue has been experienced at Turkey Point and was discussed in the applicant's description of cracking (Section 3.2.7.2.1 of the LRA). No additional aging effects requiring management were identified from this review beyond those identified in Section 3.2.7.2 of the LRA.

3.2.7.2 Staff Evaluation

In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in Section 3.2.7 (including Table 3.2-1), pertinent sections of Appendix B of the Turkey Point Units 3 and 4 LRA and the applicant's April 19, 2001, response to the staff's February 2, 2001, RAI, regarding the applicant's demonstration that the effects of aging will be adequately managed so that the intended function would be maintained consistent with the CLB throughout the period of extended operation for the steam generators.

The staff's review of the applicant's LRA for aging effects that apply to the steam generators includes the review of aging management during the period of extended operation for the following internal and external aging effects: (1) cracking, (2) loss of material, and (3) loss of mechanical closure integrity.

As stated in Table 3.2-1 of the LRA, cracking is managed by the ASME Section XI ISI programs, chemistry control and the steam generator integrity program; loss of material is managed by the chemistry control program; and loss of mechanical closure integrity is managed by the boric acid wastage surveillance program and the ASME Section XI ISI programs. Staff evaluations of these existing programs are described in Sections 3.1.1 ("Chemistry Control Program"), 3.9.1 ("ASME Section XI ISI Programs"), 3.9.3 ("Boric Acid Wastage Surveillance Program") and 3.9.14 ("Steam Generator Integrity Program"). On the basis of the evaluations of these AMPs in the SER sections described above and the following evaluation, the staff finds that these AMPs are acceptable in managing the pertinent aging effects consistent with the CLB throughout the period of extended operation.

Section 3.2.7.2.1 of the LRA states that, at Turkey Point, cracking due to fatigue is identified as a TLAA and is analytically addressed in Section 4.3.1 of the LRA. The staff's evaluation of fatigue is presented in Section 4.3 of this SER.

In Section 3.2.7.2.2 (Loss of Material) of the LRA, the aging mechanisms that can cause loss of material for the steam generators are listed. However, industry operating experience indicated that erosion (aging mechanism) could cause the loss of section thickness (aging effect) of a component, and this aging effect is not addressed in the application. One example of this aging effect is the loss of section thickness of the feedwater impingement plate supports in the Harris Nuclear Plant steam generators. In RAI 3.2.7-1, the staff requested that the applicant provide the plant specific AMP for this aging effect in general for the steam generators and other components in the plant within the scope of license renewal for the period of extended

operation. In response to this RAI, the applicant stated that the feedwater impingement plate design at the Harris Nuclear Plant is not present in the Turkey Point Plant steam generators. The Turkey Point steam generator tube support system is stainless steel and is not susceptible to erosion. Other steam generator components are inspected for loss of material due to erosion as part of the steam generator integrity program. The applicant further stated that the only components identified through the aging management review process as subject to loss of material due to erosion are the emergency containment coolers (ECCs). The emergency containment coolers inspection as described in Appendix B Subsection 3.1.3, page B-14 of the LRA is credited for managing this aging effects. The staff finds that the applicant's treatment of this aging effect is reasonable.

The applicant identified "loss of mechanical closure integrity" as the aging effect requiring management for primary bolting. Section 3.2.7.2.3 of the LRA identifies stress relaxation and/or aggressive chemical attack as two potential causes of a loss of mechanical closure integrity. However, industry operating experience indicates that a loss of mechanical closure integrity can also result from SCC. Section 5.4 of Appendix C to the LRA discusses the "loss of mechanical closure integrity" aging effect. The last paragraph of Section 5.4 briefly discusses SCC; however, the applicant did not thoroughly describe the actions taken to prevent SCC in primary bolting. In RAI 3.2.7-3, the staff requested that the applicant more thoroughly describe the actions taken (e.g., the use of non-susceptible material and/or the use of non-aggressive lubricants) to prevent SCC in primary bolting. In addition, since operating experience has shown that some alloy steels with lower yield strengths are susceptible to SCC, the staff requested the applicant identify the range of yield strengths used at Turkey Point, Units 3 and 4, and the susceptibility of those material strengths. In response to this RAI, the applicant thoroughly described the actions taken to address the concern of loss of mechanical closure integrity of primary bolting due to SCC.

The applicant also discussed the actual bolting material used at Turkey Point Units, 3 and 4, and indicated that the bolting is expected to have yield strengths less than 150 ksi based on the use of ASTM A-193 Grade B7 bolting at Turkey Point, Units 3 and 4. However, because the maximum yield strength is not specified for this bolting material, the applicant stated that assurance cannot be provided that the yield strength of the bolting would not exceed 150 ksi. (Bolting with a yield strength above 150 ksi could potentially be susceptible to SCC.) The applicant pointed to maintenance practices that control bolt torquing and contaminants that have been effective in eliminating the potential for stress corrosion of bolting materials. In addition, the applicant reviewed industry and Turkey Point operating experience and did not identify any recent bolting failures attributed to SCC. The applicant concluded that cracking of bolting material due to SCC at Turkey Point is not considered an aging effect requiring management.

Several NRC generic communications (e.g., NRC IE Bulletin 82-02, "Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants" and NRC Generic Letter 91-17, "Generic Safety Issue 29, 'Bolting Degradation or Failure in Nuclear Power Plants'") provide information on industry operating experience associated with the degradation of primary bolting, but are not referenced by the applicant in Section 3.2.7.3.1 of the LRA. In RAI 3.2.7-3, the staff requested the applicant explain why these generic communications were not identified as reference documents and whether the information contained within was assessed for Turkey Point, Units 3 and 4. In addition, NRC Information Notice (IN) 97-88, "Experiences During Recent Steam Generator Inspections," was also not identified as a reference in Section

3.2.7.3.1 of the LRA. In RAI 3.2.7-5, the staff requested that the applicant discuss why the IN was not listed as a reference for the Turkey Point Unit 3 and 4 LRA. In response to these RAIs, the applicant stated that these generic communications were inadvertently omitted from the LRA and had been assessed for Turkey Point, Units 3 and 4.

3.2.7.3 FSAR Supplement

The staff has confirmed that the FSAR supplement contains an appropriate summary description of the programs and activities for managing the effects of aging for the Turkey Point plant steam generators.

3.2.7.4 Conclusion

The staff has reviewed the information in Section 3.2.7, "Steam Generators," Appendices A and B to the LRA as supplemented by the April 19, 2001, response to the RAI. Based on the staff's evaluation of aging effects and AMPs the staff concludes that the applicant has demonstrated that the effects of aging associated with the steam generators will be adequately managed such that there is reasonable assurance that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation.

3.3 Engineered Safety Features Systems

In LRA, Sections 2.3.2, "Engineered Safety Features Systems," and 3.3, "Engineered Safety Features Systems," the applicant describes the scoping and AMR for the engineered safety features (ESFs) systems. Appendices A, B, and C to the LRA also contain supplementary information relating to the AMR of the ESFs systems. The staff reviewed Sections 2.3.2 and 3.3, and the applicable portions of Appendices A, B, and C to determine whether the applicant has provided sufficient information to demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB throughout the period of extended operation, in accordance with 10 CFR 54.21(a)(3) for the ESFs system structures and components (SCs) that aredetermined to be within the scope of license renewal and subject to an AMR.

The Turkey Point ESFs systems include the following seven systems:

- emergency containment cooling
- containment spray
- containment isolation
- safety injection
- residual heat removal
- emergency containment filtration
- containment post accident monitoring and control

In LRA Section 2.1, "Scoping and Screening Methodology," the applicant describes the method used to identify the SCs that are within the scope of license renewal and subject to an AMR. The applicant identifies and lists the ESFs system SCs in Section 2.3.2 of the LRA. The staff's

evaluation of the scoping methodology and the ESFs system SCs included within the scope of license renewal and subject to an AMR is documented in Sections 2.1 and 2.3.2 of this SER, respectively.

In LRA Appendix A, "Updated Final Safety Analysis Report Supplement," the applicant provides a summary description of the programs and activities used to manage the effects of aging, as required in 10 CFR 54.21(d). The applicant provides a more detailed description of these AMPs for the staff to use in its evaluation in Appendix B to the LRA. In Appendix C to the LRA, the applicant describes the processes used to identify the applicable aging effects for the SCs that are subject to an AMR. In Appendix D to the LRA, the applicant states that no changes to the Turkey Point Technical Specifications (TSs) have been identified. A discussion of each system follows.

3.3.1 Emergency Containment Cooling System

3.3.1.1 Summary of Technical Information in the Application

The applicant describes its AMR of the emergency containment cooling system for license renewal in Section 2.3.2.1, "Emergency Containment Cooling" and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the emergency containment cooling system will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The emergency containment cooling system is designed to remove sufficient heat to maintain the containment below its structural design pressure and temperature during a loss-of-coolant accident or main steam line break. In addition, the emergency fan cooling units continue to remove heat after the maximum hypothetical accident and reduce containment pressure to atmospheric. Heat removed from the containment is transferred to component cooling water. Emergency containment cooling consists of three fan cooling units that are located above the refueling floor, around the inside of each containment.

The emergency containment cooling components subject to an AMR include the emergency fan cooler units (pressure boundary only) and the associated heat exchanger coils. The intended functions of the emergency containment cooling components subject to an AMR include pressure boundary integrity and heat transfer. A complete list of the emergency containment cooling components requiring an AMR, the component intended functions, and the applicable AMPs is provided in Table 3.3.1 of the LRA.

3.3.1.2 Staff Evaluation

3.3.1.2.1 Effects of Aging

The components in the emergency containment cooling system are fabricated from carbon steel and admiralty brass exposed to an internal environment of treated water. The components include emergency containment cooler headers, tubes (inside diameter), and housings. The aging effects of these materials in the treated water environment are identified in Table 3.3-1 of the LRA. The treated water environment is borated water for this application. The applicable internal aging effects in the treated water environment include loss of material

and fouling. A discussion of the aging effects for carbon steel and admiralty brass components in a treated water environment is provided below.

The loss of material due to general corrosion for carbon steel components exposed to treated water is the result of a chemical or electrochemical reaction between the material and the environment when both oxygen and moisture are present. Carbon steels are susceptible to external general corrosion in all areas with the exception of those exposed to a controlled, air-conditioned environment, and those applications where the metal temperature is greater than 212 °F.

The loss of material due to pitting corrosion for carbon steel components and admiralty brass components in a treated water environment is also an aging effect requiring management. Pitting corrosion is a form of localized attack that results in depressions in the metal. For treated water systems, oxygen is required for the initiation of pitting corrosion with contaminants, such as halogens or sulfates. Pitting corrosion occurs when passive films in local areas attack passive materials. Once a pit penetrates the passive film, galvanic conditions occur because the metal in this pit is anodic relative to the passive film. Maintaining adequate flow rates over this exposed surface of a component can inhibit pitting corrosion. However, stagnant or low flow conditions are assumed to exist in all systems where dead legs of piping, such as vents or drains exist.

The loss of material due to galvanic corrosion for carbon steel and admiralty brass in a treated water environment is an aging effect requiring management, when coupled with material having higher electrical potential. The loss of material due to galvanic corrosion can occur only when materials with different electrochemical potentials are in contact within an aqueous environment. Generally the effects of galvanic corrosion are precluded by design. In galvanic couples involving brass and carbon steel materials, the lower potential (more anodic) material would be preferentially attacked.

The loss of material due to erosion/corrosion is an aging effect requiring management for carbon steel in treated water under certain conditions. Erosion/corrosion is influenced by fluid flow velocity, geometry, environmental characteristics, and material susceptibility. Carbon steels are most susceptible to erosion/corrosion. Most of the treated water systems are immune from erosion/corrosion because of their non-corrosive service fluids. One exception to the above involves high-energy piping systems that are susceptible to a form of erosion/ corrosion called flow-accelerated corrosion (FAC). FAC involves the dissolution of protective oxides on carbon and low alloy steel components, and the continual removal of these dissolved oxides by flowing fluid.

The loss of material due to microbiologically influenced corrosion (MIC) is an aging effect requiring management for carbon steel and admiralty brass in a treated water environment. MIC is a form of localized, corrosive attack accelerated by the influence of microbiological activity due to the presence of certain organisms. Microbiological organisms can produce corrosive substances, as a byproduct of their biological processes, that disrupt the protective oxide layer on the component materials and lead to a material depression similar to pitting corrosion.

The loss of material due to selective leaching is an aging effect requiring management for admiralty brass in a treated water environment. Selective leaching (also known as dealloying)

is the dissolution of one element from a solid alloy by corrosion processes. The most common form of selective leaching is dezincification with the removal of zinc from susceptible brass. The addition of small amounts of alloying elements such as phosphorus, arsenic, and antimony is effective in inhibiting this attack in copper-zinc alloys. Therefore, selective leaching of brass applies only to "uninhibited" materials.

Biological and particulate fouling of admiralty brass is an aging effect requiring management in treated water environments. Fouling may be due to an accumulation of particulates or macro-organisms. Fouling is an aging effect that could cause the loss of heat transfer as an intended function at Turkey Point. Biological fouling can also lead to environmental conditions conducive to MIC.

The components in the emergency containment cooling system are also fabricated from carbon steel exposed to an internal environment of air/gas. The components include the emergency containment cooler housings. The aging effects of these materials in the air/gas environment are identified in Table 3.3-1 of the LRA. The applicable internal aging effects in the air/gas environment include loss of material. The loss of material due to general, pitting, galvanic, and crevice corrosion is an aging effect requiring management for carbon steel in atmospheric air/gas environments.

The components in the emergency containment cooling system are also fabricated from carbon steel and admiralty brass exposed to an external environment of containment air and borated water leaks. The components include emergency containment cooler headers, tubes (outside diameter), housings and bolting. The aging effects of these materials in the external environment are identified in Table 3.3-1 of the LRA. The aging effects of these materials in the containment air and borated water leaks are loss of material and loss of mechanical closure integrity.

The loss of material due to general and pitting corrosion is an aging effect requiring management for carbon steel in containment environments and admiralty brass when wetted in a containment environment. The loss of material due to crevice corrosion and MIC is an aging effect for carbon steel when wetted in a containment environment. The loss of material due to aggressive chemical attack is an aging effect requiring management for carbon steel susceptible to potential borated water leaks. The loss of mechanical closure integrity due to aggressive chemical attack is also an aging effect requiring management for mechanical closure carbon and low alloy steel bolting susceptible to potential borated water leaks.

Based on the description of the emergency containment cooling system components in the internal and external environments, and the materials used in the fabrication of the various components, the staff determined that the applicant has identified the applicable aging effects consistent with published literature and industry experience.

3.3.1.2.2 Aging Management Programs

To manage the aging effects for the carbon steel emergency containment cooler headers exposed to treated borated water, the applicant identified the following AMPs:

- chemistry control program
- galvanic corrosion susceptibility inspection program

To manage the aging effects for the admiralty brass emergency containment cooler tubes (inside diameter) exposed to treated borated water, the applicant identified the following AMPs:

- chemistry control program
- emergency containment cooler inspection

To manage the aging effects for carbon steel emergency containment cooler housings exposed to air/gas, the applicant identified the following AMP:

- systems and structures monitoring program

To manage the aging effects for emergency containment cooler headers exposed to containment air and borated water leaks, the applicant identified the following AMPs:

- systems and structures monitoring program
- boric acid wastage surveillance program

To manage the aging effects associated with the dissolution of protective oxides on carbon and low alloy steel components (flow-accelerated corrosion), the applicant identified the following AMP:

- flow-accelerated corrosion program

To manage the aging effects for the emergency containment cooler housings exposed to containment air and borated water leaks, the applicant identified the following AMPs:

- systems and structures monitoring program
- boric acid wastage surveillance program

To manage the aging effects for bolting exposed to borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

The staff reviewed the information provided in the LRA for the AMPs used by the applicant to manage the aging of the emergency containment cooling system components, and determined that the applicant adequately identified the AMPs to manage the applicable aging effects of this system. Refer to Sections 3.1.1, 3.1.3.3, 3.8.3, 3.8.5, and 3.9.3 of this SER for the review of these AMPs.

3.3.1.3 Conclusion

The staff has reviewed the information in Sections 2.3.2.1 and 3.3 of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the emergency containment cooling system will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB during the period of extended operation.

3.3.2 Containment Spray

3.3.2.1 Summary of Technical Information in the Application

The applicant describes its scoping and AMR of the containment spray system for license renewal in Section 2.3.2.2, "Containment Spray" and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the containment spray system will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The containment spray system is designed to remove sufficient heat to maintain the containment below its design pressure and temperature during a loss-of-coolant accident or main steam line break. The containment spray system is composed of two motor-driven horizontal centrifugal pumps, each discharging to two spray lateral headers located near the top of the containment structure. The system also utilizes the residual heat removal (RHR) pumps and heat exchangers for the long-term recirculation phase of containment spray, as described in subsection 2.3.2.5 of the LRA. Additionally, the containment spray system provides a source of water for the emergency containment filtration spray. The components associated with this function are included in the scope of the emergency containment filtration.

The containment spray components subject to an AMR include the pumps and valves (pressure boundary only), heat exchangers, cyclone separators, piping, tubing, fittings, orifices, and spray nozzles. The intended functions for the containment spray components subject to an AMR include pressure boundary integrity, spray, throttling, filtration, and heat transfer. A complete list of the containment spray components requiring an AMR and the component intended functions are provided in Table 3.3-2 of the LRA. The AMR for containment spray is discussed in Section 3.3 of the LRA.

3.3.2.2 Staff Evaluation

3.3.2.2.1 Effects of Aging

For the containment spray system, the applicant stated that stainless steel pumps, valves, piping, fittings, tubing and other components are exposed to treated borated water, treated water or air/gas. As discussed in Table 3.3-2 of the LRA, for the stainless steel components exposed to treated borated water, loss of material is the applicable aging effect. In the Florida Power and Light (FPL) letter L-2001-60, dated March 30, 2001, the applicant provided additional technical discussions that justified that the aging effect of crack initiation and growth due to stress-corrosion cracking (SCC) for stainless steel components is not an applicable aging effect for the containment spray system. For the stainless steel components exposed only to treated water, such as, the containment spray pump seal water heat exchanger tubes (outside diameter), tube coil bands and clips, loss of material and fouling are applicable aging effects. Loss of material alone is the applicable aging effect for carbon steel, brass and cast iron components that are exposed to treated borated water. For carbon steel valves, piping, and fittings and bronze spray nozzles that are exposed to air/gas, there is no aging effect.

There are no aging effects for containment spray system components exposed to "indoor-not air-conditioned" and the containment air environments on stainless steel, brass and bronze. For containment spray pump seal water heat exchanger shells and covers made of cast iron

exposed to an "indoor-not air-conditioned" environment or borated water leaks, the applicable aging effect is loss of material. For valves, piping, and fittings, made of carbon steel and exposed to borated water leaks or the containment air environment, loss of material is the applicable aging effect. For carbon steel bolting exposed to borated water leaks the aging effect is loss of mechanical closure integrity.

Based on the description of the containment spray system components in the internal and external environments, and the materials used in the fabrication of the various components, the staff found that the applicant adequately identified the aging effects that are applicable for this system.

3.3.2.2.2 Aging Management Programs

To manage the aging effects for the stainless steel pumps, valves, piping, fittings, tubing and other components exposed to treated borated water, treated water or air/gas, the applicant identified the following AMP:

- chemistry control program

To manage the aging effects on the stainless steel components exposed to treated water, such as the containment spray pump seal water heat exchanger tubes (outside diameter), tube coil bands and clips, the applicant identified the following AMP:

- chemistry control program

To manage the aging effects for the brass and cast iron components exposed to treated borated water, the applicant identified the following AMPs:

- chemistry control program
- galvanic corrosion susceptibility inspection program

To manage the aging effects for the carbon steel valves, piping, fittings and tubing exposed to air/gas and treated borated water, the applicant identified the following AMPs:

- chemistry control program
- galvanic corrosion susceptibility inspection program
- containment spray system piping inspection program

To manage the aging effects for cast iron containment spray pump seal water heat exchanger shells and covers and carbon steel valves, piping, and fittings exposed to an "indoor-not air-conditioned" environment or a containment air environment, the applicant identified the following AMP:

- systems and structures monitoring program

To manage the aging effects for cast iron containment spray pump seal water heat exchanger shells and covers and carbon steel valves, piping, and fittings exposed to borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

To manage the aging effects for the carbon steel bolting exposed to borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

The staff reviewed the information provided in the LRA for the AMPs used by the applicant to manage the aging of the containment spray system components, and determined that the applicant adequately identified the AMPs to manage the applicable aging effects of this system. Refer to Sections 3.1.1, 3.1.3, 3.8.5, 3.9.3, and 3.9.5 of this SER for the review of these AMPs.

3.3.2.3 Conclusion

The staff has reviewed the information in Sections 2.3.2.2 and 3.3 of the LRA and the applicant's response to the staff's RAI. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the containment spray system will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB throughout the period of extended operation.

3.3.3 Containment Isolation

3.3.3.1 Summary of Technical Information in the Application

The applicant describes its scoping and AMR of the containment isolation system for license renewal in Section 2.3.2.3, "Containment Isolation," and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the containment isolation system will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The containment isolation system is an ESF that provides for the closure or integrity of containment penetrations to prevent leakage of uncontrolled or unmonitored radioactive materials to the environment. All containment penetrations and associated containment isolation valves and components that ensure containment integrity, regardless of where they are described, require an AMR. Breathing air, nitrogen and hydrogen, and containment purge are the process systems for which the only license renewal intended function is containment isolation. The flow diagrams listed in Table 2.3-4 of the LRA display the evaluation boundaries for the portions of breathing air, nitrogen and hydrogen, and containment purge that are within the scope of license renewal.

The breathing air, nitrogen and hydrogen, and containment purge components within the scope of license renewal and subject to an AMR include valves (pressure boundary only), piping, tubing, fittings, and debris screens (containment purge). The intended functions for breathing air, nitrogen and hydrogen, and containment purge components requiring an AMR and the component intended functions are listed in Table 3.3-3 of the LRA. The AMR for containment isolation is discussed in Section 3.3 of the LRA.

3.3.3.2 Staff Evaluation

3.3.3.2.1 Effects of Aging

Containment Purge Systems

The components in the containment purge systems are fabricated from carbon and stainless steel exposed to an internal environment of air/gas. The components include valves, piping, tubing, fittings, debris screen gratings and debris screen banding. The applicant did not identify any aging effects of these materials in the air/gas environment, as indicated in Table 3.3-3 of the LRA. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with carbon and stainless steel components exposed to air/gas that could cause a component to lose its ability to perform an intended function during the period of extended operation.

The components in the containment purge systems are also fabricated from carbon and stainless steel exposed to external environments of outdoor, containment air, and borated water leaks. The components include valves, piping, tubing, fittings, bolting, and orifices. The applicant identified loss of material and loss of mechanical closure integrity as the aging effects requiring management for the carbon and stainless steel components exposed to these external environments.

The loss of material due to general, pitting, galvanic, crevice corrosion, and microbiologically influenced corrosion is the aging effect requiring management for carbon steel components exposed to the outdoor environment. The loss of material due to general, pitting, crevice, and microbiologically influenced corrosion is the aging effect requiring management for carbon steel when wetted in containment environments. The loss of material due to aggressive chemical attack is an aging effect requiring management for carbon steel susceptible to potential borated water leaks. The loss of mechanical closure integrity due to aggressive chemical attack is an aging effect requiring management for mechanical closure carbon and low alloy steel bolting susceptible to potential borated water leaks.

A detailed description of the aging effects associated with the loss of material due to general, pitting, galvanic, and microbiologically influenced corrosion is provided above in Section 3.3.1.2.1 of this SER. The descriptions in Section 3.3.1.2.1 of this SER are also applicable to carbon steel components exposed to external environments.

The loss of material due to crevice corrosion occurs when a crevice or area of stagnant or low flow exists that allows a corrosive environment to develop in a component. It occurs most frequently in joints and connections, or points of contact between metals and non-metals, such as gasket surfaces, lap joints and under bolt heads.

The loss of mechanical closure integrity is an aging effect associated with bolted mechanical closures that can result from the loss of pre-load due to cyclic loading, gasket creep, thermal or other effects, cracking, or loss of bolting material. Loss of bolting material can result in a loss of a component's pressure boundary integrity. Corrosion of stainless steel fasteners has only been a concern where leakage of a joint occurs, specifically, when bolting is exposed to aggressive chemical attack, such as that resulting from borated water leaks.

Breathing Air Systems

The components in the breathing air systems are fabricated from stainless steel exposed to an internal environment of air/gas. The components include valves, piping, and fittings. The applicant did not identify any aging effects of this material in the air/gas environment, as indicated in Table 3.3-3 of the LRA. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with stainless steel components exposed to air/gas that could cause a component to lose its ability to perform an intended function during the period of extended operation.

The components in the breathing air systems are also fabricated from carbon and stainless steel exposed to external environments of containment air, indoor-not air-conditioned, and borated water leaks. The components include valves, piping, fittings, and bolting. The applicant did not identify any aging effects of stainless steel in the containment air and indoor-not air-conditioned environment, as indicated in Table 3.3-3 of the LRA. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with the stainless steel components exposed to the containment air and indoor-not air-conditioned environment that could cause a component to lose its ability to perform an intended function during the period of extended operation. The applicant identified loss of mechanical closure integrity due to aggressive chemical attack as an aging effect requiring management for the carbon steel components exposed to the borated water leaks environment. The staff agreed that the loss of mechanical closure integrity is an aging effect associated with bolted mechanical closures that can result from the loss of pre-load due to cyclic loading, gasket creep, thermal or other effects, cracking, or loss of bolting material.

Nitrogen and Hydrogen Systems

The components in the nitrogen and hydrogen systems are fabricated from carbon steel and stainless steel exposed to an internal environment of air/gas. The components include valves, tubing, piping, and fittings. The applicant did not identify any aging effects of this material in the air/gas environment, as indicated in Table 3.3-3 of the LRA. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with stainless steel and carbon steel components exposed to air/gas that could cause a component to lose its ability to perform an intended function during the period of extended operation.

The components in the nitrogen and hydrogen systems are also fabricated from carbon and stainless steel exposed to external environments of containment air, indoor-not air-conditioned, and borated water leaks as indicated in Table 3.3-3 of the LRA. The components include valves, piping, tubing, fittings, and bolting. The applicant did not identify any aging effects of stainless steel components in the containment air and indoor-not air-conditioned environment. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with the stainless steel components exposed to the containment air and indoor-not air-conditioned environment that could cause a component to lose its ability to perform an intended function during the period of extended operation. The applicant identified the loss of material for carbon steel components in the external environments of containment air, indoor-not air-conditioned, and borated water leaks. The staff agreed that the loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion is an aging effect requiring management for carbon steel in containment air. In addition, the staff agreed that loss of material due to general, pitting, galvanic, and microbiologically influenced corrosion

is an aging effect requiring management for carbon steel components exposed to an indoor-not air-conditioned environment. The applicant identified loss of mechanical closure integrity due to aggressive chemical attack as an aging effect requiring management for the carbon steel components exposed to the borated water leaks environment. The staff agreed that the loss of mechanical closure integrity is an aging effect associated with bolted mechanical closures that can result from the loss of pre-load due to cyclic loading, gasket creep, thermal or other effects, cracking, or loss of bolting material.

Based on the description of the containment isolation system components in the internal and external environments, and the materials used in the fabrication of the various components, the staff found that the applicant adequately identified the aging effects that are applicable for these systems.

3.3.3.2.2 Aging Management Programs

Containment Purge Systems

To manage the aging effects of the carbon steel valves, piping and fittings exposed to the external environments of the outdoor and containment air, the applicant identified the following AMP:

- systems and structures monitoring program

To manage the aging effects of the carbon steel valves, piping and fittings exposed to the external environments of borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

To manage the aging effects of the carbon steel bolting in the external environment of borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

Nitrogen and Hydrogen Systems

To manage the aging effects of the carbon steel valves, piping and fittings in the external environments of containment air and indoor-not air-conditioned environments, the applicant identified the following AMP:

- systems and structures monitoring program

To manage the aging effects of the carbon steel valves, piping and fittings in the external environment of borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

To manage the aging effects of the carbon steel bolting in the environment of borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

The staff reviewed the information provided in the LRA for the AMPs used by the applicant to manage the aging of the containment isolation system components, and determined that the applicant adequately identified the AMPs to manage the applicable aging effects of this system. Refer to Sections 3.1.3, and 3.9.3 of this SER for the review of these AMPs.

3.3.3.3 Conclusion

The staff has reviewed the information in Sections 2.3.2.3 and 3.3 of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the containment isolation system will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB throughout the period of extended operation.

3.3.4 Safety Injection

3.3.4.1 Summary of Technical Information in the Application

The applicant describes its AMR of the safety injection (SI) system for license renewal in Section 2.3.2.4, "Safety Injection," and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the SI system will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

In Section 3.3.1 of the Turkey Point LRA, FPL identifies that the SI system for Turkey Point, Units 3 and 4, is subject to internal environments of treated water-borated, treated water, lubricating oil, and air/gas. FPL clarifies the scope of the definitions for these internal environments in Table 3.0-1 of the Turkey Point LRA. In Section 3.3.1 of the Turkey Point LRA, FPL identifies that the SI system for Turkey Point, Units 3 and 4, is subject to the external environments of outdoor, indoor-not air conditioned, containment air, and potential borated water leak environments. FPL defines the scope for these external environments in Table 3.0-2 of the Turkey Point LRA. Table 3.3-4 of the Turkey Point LRA clarifies which of these environments apply to the respective SI components that are within the scope of license renewal.

In Table 3.3-4 of the Turkey Point LRA, FPL identifies that the tanks, pumps, heat exchangers, piping, tubing, and associated components and commodity groups for the SI system are constructed of either stainless steel, carbon steel, cast iron, gray cast iron Inconel, and brass materials.

In Section 3.3.2 of the Turkey Point LRA, FPL identifies that the SI system is subject to the following aging effects: loss of material for components fabricated from carbon steel, stainless steel, brass or cast iron materials; cracking for certain stainless steel components; loss of material, cracking and fouling for stainless steel heat exchanger tubing and cast iron thrust bearer coolers; and loss of mechanical closure integrity for mechanical closure bolts that are fabricated from carbon steel. Table 3.3-4 of the Turkey Point LRA further summarizes the aging effects that apply to the specific SI components that fall within the scope of license renewal.

3.3.4.2 Staff Evaluation

In Table 3.3-4 of the Turkey Point LRA, FPL identifies which of the internal and external environments identified in Section 3.3.1 of the LRA for the SI system apply to the respective SI components that fall within the scope of license renewal. In Table 3.3-4 of the Turkey Point LRA, FPL also identifies the materials of fabrication for the SI components that are within the scope of license renewal.

The staff concurs with FPL's determination of the environments that could induce the aging effects for the SI components identified in the LRA, and with FPL's identification of the materials of fabrication for the SI components.

3.3.4.2.1 Aging Effects

Section 3.3.4.2.2 of this SE, and Section 3.3.2 and Table 3.3-4 provides a summary of the aging effects that may affect the intended functions of the SI components during periods of extended operation for the Turkey Point nuclear units. In a letter dated March 30, 2001 (L-2001-60), FPL provided additional technical discussions that justified that the aging effects identified in Section 3.3.2 and Table 3.3-4 of the LRA. FPL letter L-2001-60, dated March 30, 2001, continued the following information relative to the aging effects identified for the SI components:

- Provided FPL's responses to the staffs RAIs on the SI system as it relates to license renewal of the Turkey Point units (i.e., provided the responses to RAIs Nos. 3.3.4-1, 3.3.4-2, and 3.3.4-3).

- Informed the staff that there are no SI components fabricated from welded cast iron materials, and that therefore cracking would not be an aging effect that would require management for the SI pump thrust bearing coolers and SI shaft seal heat exchanger shells during the extended periods of operation for the Turkey Point units.

- Clarified that cracking is a potential effect that would require management during the extended periods of operation for the non-stress-relieved heat-affected zones of weld joints on the external surfaces of large-bore, thin-walled stainless steel SI piping located in trenches and outdoors.

- Clarified that, since the necessary conditions for SCC of austenitic stainless steels and nickel-based alloys in contact with treated water are concentrations of halogens above 150 parts-per billion (ppb) and sulfates above 100 ppb, and elevated system operating temperatures above 140 °F, and since the SI system is normally in the standby condition at temperatures less than 140 °F, cracking of the internal surfaces of the SI system in contact with borated treated water is not an aging effect requiring management during the extended periods of operation for the Turkey Point units.

- Stated that cracking in the tube shields of heat exchangers can result from either flow-induced vibrational fatigue or SCC.

- Provided a reference, "Corrosion of Metals in Marine Environments," J.A. Beavers, K.H. Koch, and W.E. Berry, Metals and Ceramics Information Center Report (July 1986), to

support the FPL conclusion that copper-based alloys exhibit excellent corrosion resistance in treated water systems.

- Clarified that, since copper alloy materials exhibit excellent resistance to SCC in treated water, SCC of brass tube shields to the SI pump shaft heat exchangers is not an aging effect that requires managing during the periods of extended operation for the Turkey Point units.

- Clarified that, since high cycle fatigue failures of components subject to flow-induced vibration would have already been reported during the early part of the 40-year licensed term for the Turkey Point units, and since FPL's review of U.S. operating history did not identify instances of cracking in tube shields, flow-induced vibrational fatigue of brass tube shields to the SI pump shaft heat exchangers is not an aging effect that requires managing during the periods of extended operation for the Turkey Point units.

The information in Section 3.3.2 and Table 3.3-4 of the Turkey Point LRA, as amended by the contents of FPL's responses in letter L-2001-60 to the staff RAIs 3.3.4-1, 3.3.4-2, and 3.3.4-3, demonstrates that FPL has sufficiently evaluated the SI components as exposed to the internal and external environmental conditions for the components and has sufficiently identified those aging effects that could affect the intended functions of the SI components during periods of extended operation for the Turkey Point nuclear units. The scope of RAIs 3.3.4-1, 3.3.4-2, and 3.3.4-3 on the SI system is based on whether FPL has identified those SI components that could potentially be susceptible to cracking within the extended operating terms for the SI units. FPL's responses to the RAIs demonstrate that FPL has performed a sufficient evaluation to identify which of the SI components falling within the scope of license renewal have the potential to crack during the extended operating terms for the units. FPL's justification for omitting cracking as an applicable aging effect for the SI components is based on any of the following bases or combinations thereof:

- Operating conditions for the SI system preclude cracking from being an applicable aging effect for a particular SI component.

- Environmental conditions will be controlled to a sufficient level to preclude cracking from being an applicable aging effect for a particular SI component.

- Material properties for the SI component material, when combined with industry experience provide sufficient justification to omit identifying cracking as an applicable aging effect for the SI component.

For those SI components that have not been identified as being susceptible to cracking within the extended operating periods, FPL has provided sufficient evaluation and justification to omit cracking as a potential aging effect for these components. The staff therefore finds FPL's identification of the applicable aging effects for the SI components to be acceptable.

3.3.4.2.2 Aging Management Programs

Table 3.3-4 of the Turkey Point LRA includes the following programs that will be used to manage the aging effects that are identified as being applicable to the SI components that fall within the scope of license renewal:

- boric acid wastage surveillance program
- chemistry control program
- field-erected tanks internal inspection program
- galvanic corrosion susceptibility program
- systems and structures monitoring program

For those SI components that have been identified as having the potential to crack within the extended operating terms for the Turkey Point units, FPL does not always credit the ISI program as being one of the AMPs that will manage cracking during the extended operating term. However, the fact that FPL may not be crediting the ISI as a program for managing cracking during license renewal does not mean that FPL will be omitting the inspections of the SI system that are required under its current ISI program. FPL will still perform all ISIs of the SI system required to be conducted under 10 CFR 50.55a and Section XI of the ASME Code during the initial 40-year license operating terms for the units.

The staff reviewed the information provided in the LRA for the AMPs used by the applicant to manage the aging of the ISI system components, and determined that the applicant adequately identified the AMPs to manage the applicable aging effects of this system. Refer to Sections 3.1.1, 3.1.3, 3.8.4, 3.8.5, and 3.9.3 of this SER for the review of these AMPs.

3.3.4.3 Conclusion

FPL has performed an evaluation of the SI system as it relates to identifying and managing the applicable aging effects for the SI components within the scope of license renewal. FPL's evaluation of the components in SI system as provided in Section 3.3 and Table 3.3.4 of the Turkey Point LRA, as amended by the responses to RAIs 3.3.4-1, 3.3.4-2, and 3.3.4-3 in FPL letter no. L-2001-60, demonstrates that FPL has identified those aging affects that are applicable to the SI components and that will require management during the extended periods of operation. Table 3.3.4 clearly identifies how these aging effects will be managed during the periods of extended operation for the Turkey Point units. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the SI system will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB throughout the period of extended operation.

3.3.5 Residual Heat Removal

3.3.5.1 Summary of Technical Information in the Application

The applicant describes its AMR of the residual heat removal (RHR) system for license renewal in Section 2.3.2.5, "Residual Heat Removal " and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the RHR system will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The RHR system delivers borated water to the reactor coolant systems during the injection phase of a design-basis accident. Following a loss-of-coolant accident, the RHR system cools and recirculates water that is collected in the containment recirculation sumps and returns it to the reactor coolant, containment spray, and SI systems to maintain reactor core and

containment cooling functions. In addition, during normal plant operations, the RHR system removes residual and sensible heat from the core during plant shutdown, cooldown, and refueling operations.

The RHR components subject to an AMR include pumps and valves (pressure boundary only), heat exchangers, orifices, piping, tubing, and fittings. The intended functions for the RHR system components subject to an AMR include pressure boundary integrity, heat transfer, and throttling. A complete list of the RHR components requiring an AMR and the component intended functions are provided in Table 3.3-5 of the LRA. The AMR for the RHR system is discussed in Section 3.3 of the LRA.

In Section 3.3.1, "Materials and Environments," of the Turkey Point LRA, FPL identifies that the RHR system for Turkey Point, Units 3 and 4, is subject to the internal environments of treated water-borated, treated water, lubricating oil and air/gas. FPL clarifies the scope of the definitions for these internal environments in Table 3.0-1 of the Turkey Point LRA. In Section 3.3.1 of the Turkey Point LRA, FPL identifies that the RHR system for Turkey Point, Units 3 and 4, is subject to the external environments of outdoor, indoor-not air conditioned, containment air, embedded/encased, and potential borated water leakage. FPL defines the scope for these external environments in Table 3.0-2 of the Turkey Point LRA. Table 3.3-5 of the Turkey Point LRA clarifies which of these environments are applicable to the respective RHR components that are within the scope of license renewal.

In Table 3.3-5 of the Turkey Point LRA, FPL identifies that the pumps; valves; piping; and heat exchangers shells, baffles, and tubing; and associated components and commodity groups for the RHR system are constructed of either stainless steel or carbon steel materials.

In Section 3.3.2, "Aging Effects Requiring Management," of the Turkey Point LRA, FPL identifies that the RHR system is subject to the following aging effects: loss of material for components fabricated from carbon steel or stainless steel; cracking for certain stainless steel components; loss of material, cracking and fouling for stainless steel heat exchanger tubing; and loss of mechanical closure integrity for mechanical closure bolts that are fabricated from carbon steel. Table 3.3-5 of the Turkey Point LRA further summarizes the aging effects that apply to the specific RHR components that fall within the scope of license renewal.

3.3.5.2 Staff Evaluation

In Table 3.3-5 of the Turkey Point LRA, FPL identifies which of the internal and external environments identified in Section 3.3.1 of the LRA for the RHR system are applicable to the respective RHR components falling under the scope of license renewal. In Table 3.3-5 of the Turkey Point LRA, FPL also identifies the materials of fabrication for the RHR components within the scope of license renewal.

The staff concurs with FPL's determination of the environments that could induce the aging effects for the RHR components identified in the LRA, and with FPL's identification of the materials of fabrication for the RHR components.

3.3.5.2.1 Aging Effects

Section 6.0, "Aging Effects Requiring Management for Internal Environments," of Appendix C of the LRA lists and discusses the aging effects requiring management for each of the internal environments in the Turkey Point nuclear units; Section 7.0, "Aging Effects Requiring Management for External Environments," of Appendix C lists and discusses the aging effects requiring management for each of the external environments in the Turkey Point nuclear units. Section 5.0, "Potential Aging Effects," of Appendix C discusses the environmental, material, and loading parameters governing these aging effects. Section 3.3.2 of the Turkey Point LRA provides a general summary of the aging effects that may affect the intended functions of the RHR systems during periods of extended operation for the Turkey Point nuclear units. Table 3.3-5 narrows the scope of Section 3.3.2 by identifying which specific aging effects identified in Section 3.3.2 apply to the specific RHR components that fall within the scope of license renewal. The combined summaries in Section 3.3.2, Table 3.3-5, and Sections 5.0, 6.0, and 7.0 of Appendix C provide a sufficient basis as to how FPL determined which aging effects apply to the specific RHR components that fall within the scope of license renewal.

Based on the description of the RHR system components in the internal and external environments, and the materials used in fabricating the various components, the staff finds that the applicant has adequately identified the aging effects that apply to this system.

3.3.5.2.2 Aging Management Programs

Section 3.3.4, "Conclusion," of the Turkey Point LRA states that the following AMPs will be used to manage the applicable aging effects for the Turkey Point RHR system:

- boric acid wastage surveillance program
- chemistry control program
- containment spray system piping inspection program
- field erected tanks internal inspection program
- emergency containment cooler inspection
- galvanic corrosion susceptibility program
- periodic surveillance and preventive maintenance program
- systems and structures monitoring program

Table 3.3-5 of the LRA identifies which of these programs will be used to manage the aging effects identified as needing management for the specific RHR components that are within the scope of license renewal. Section 5.0 of Appendix C to the LRA discusses potential aging effects that may need to be managed during the periods of extended operation for Turkey Point non-ASME-Class 1 components. Section 6.0 of Appendix C discusses the aging effects requiring management for internal environments. For those RHR components that have been identified having the potential to crack within the extended operating terms for the Turkey Point units, FPL does not always credit the ISI program as being one of the aging programs that will manage the cracking during the extended operating terms. However, FPL will continue to perform all ISIs of the RHR required to be conducted under 10 CFR 50.55a and Section XI of the ASME Code during the initial 40-year licensed operating terms for the units.

The staff reviewed the information provided in the LRA for the AMPs used by the applicant to manage the aging effects of the RHR system components, and determined that the AMPs

identified above are acceptable to manage the applicable aging effects. Refer to Sections 3.1.1, 3.1.3, 3.8.3, 3.8.4, 3.8.5, 3.9.3, 3.9.5, and 3.9.11 of this SER for the review of these AMPs.

3.3.5.3 Conclusion

The staff has reviewed the information in Sections 2.3.2.5 and 3.3 of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the RHR system will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB throughout the period of extended operation.

3.3.6 Emergency Containment Filtration

3.3.6.1 Summary of Technical Information in the Application

The applicant describes its AMR of the emergency containment filtration system for license renewal in Section 2.3.2.6, "Emergency Containment Filtration," and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the emergency containment filtration system will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The emergency containment filtration system serves to reduce the iodine concentration in the containment atmosphere following a loss-of-coolant accident with failed fuel, to levels ensuring that the offsite dose will not exceed the guidelines of 10 CFR Part 100 at the site boundary, and to assist in limiting the dose to the control room operators to less than the limits specified by 10 CFR Part 50, Appendix A, General Design Criterion 19. The emergency containment filtration system consists of three filter units, each containing a moisture separator, a high-efficiency particulate filter bank, an impregnated charcoal filter bank, and a fan. Included in the scope of the emergency containment filtration are components carrying water from the containment spray to the emergency containment filtration for filter spray. The filter spray provides cooling of the filter in the unlikely event of a post-accident fan trip.

The emergency containment filtration components subject to an AMR include the filter units and valves (pressure boundary only), piping, tubing, fittings, and spray nozzles. The intended functions for the emergency containment filtration components subject to an AMR include pressure boundary integrity and spray. A complete list of the emergency containment filtration components requiring an AMR and the component intended functions are provided in Table 3.3-6 of the LRA. The AMR for this system is discussed in Section 3.3 of the LRA.

3.3.6.2 Staff Evaluation

3.3.6.2.1 Effects of Aging

The components in the emergency containment filtration system are fabricated from carbon steel, brass, copper, and stainless steel in an internal environment of air/gas and stainless steel exposed to an internal environment of treated water. The components include emergency containment filter housings, floodjet spray nozzles, piping/fittings, valves, and tubing. The

aging effects of these materials in the internal environments of air/gas and treated water are identified in Table 3.3-6 of the LRA. The treated water environment is borated water for this application. The applicable aging effect in the air/gas and treated water environment includes loss of material. A discussion of the aging effects for the carbon steel, brass, copper, and stainless steel components exposed to the internal environments of air/gas and treated water is provided below.

The applicant did not identify any aging effects for the brass, copper, and stainless steel emergency containment filtration system components exposed to an internal environment of air/gas, as indicated in Table 3.3-6 of the LRA. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with brass, copper, and stainless steel components exposed to air/gas that could cause a component to lose its ability to perform an intended function during the period of extended operation.

The loss of material for carbon steel components exposed to an internal environment of air/gas is an aging effect requiring management due to general, pitting, galvanic, and crevice corrosion. More specifically, the loss of material due to general corrosion is an aging effect for galvanized carbon steel in wetted air/gas environments.

Stainless steel exposed to an internal environment of treated water is assumed susceptible to the loss of material due to pitting corrosion in the presence of halogens in excess of 150 ppb or sulfates in excess of 100 ppb when dissolved oxygen is in excess of 100 ppb.

The components in the emergency containment filtration system exposed to the external environments of containment air or borated water leaks are fabricated from carbon steel, brass, copper, and stainless steel. These components include the emergency containment filter housings, floodjet spray nozzles, piping/fittings, valves, and tubing. The aging effects of these materials in the external environments of containment air and borated water leaks are identified in Table 3.3-6 of the LRA. The applicable aging effects in the containment air and borated water leaks include loss of material and loss of mechanical closure integrity, respectively. A discussion of the aging effects for the carbon steel, brass, copper, and stainless steel components exposed to the external environments of containment air and borated water leaks is provided below.

The applicant did not identify any aging effects for the brass, copper, and stainless steel emergency containment filtration system components exposed to an external environment of containment air, as indicated in Table 3.3-6 of the LRA. The applicant's position was found to be acceptable because the staff agreed that there are no aging effects associated with the brass, copper, and stainless steel components exposed to containment air that could cause a component to lose its ability to perform an intended function during the period of extended operation.

The loss of material of carbon steel components in the external environment of containment air is due to general, pitting, crevice, and microbiologically influenced corrosion. The loss of material due to general and pitting corrosion occurs when carbon steel components are wetted in containment environments.

The loss of mechanical closure integrity due to aggressive chemical attack is an aging effect that require management of mechanical closure carbon and low alloy steel bolting that is susceptible to potential borated water leaks.

Based on the description of the emergency containment filtration system components in the internal and external environments, and the materials used in the fabrication of the various components, the staff found that the applicant adequately identified the aging effects that are applicable for this system.

3.3.6.2.2 Aging Management Programs

To manage the aging effects for the emergency containment filter housings exposed to an internal environment of air/gas, the applicant identified the following AMP:

- periodic surveillance and preventive maintenance program

To manage the aging effects for the emergency containment filtration valves, and piping/fittings, exposed to an internal environment of treated water, the applicant identified the following AMP:

- chemistry control program

To manage the aging effects for the emergency containment filter housings exposed to an external environment of containment air, the applicant identified the following AMP:

- periodic surveillance and preventive maintenance program

To manage the aging effects for the emergency containment filter housings exposed to an external environment of borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

To manage the aging effects for the emergency containment filtration bolting exposed to an external environment of borated water leaks, the applicant identified the following AMP:

- boric acid wastage surveillance program

The staff reviewed the information provided in the LRA for the AMPs used by the applicant to manage the aging of the emergency containment filtration system components, and determined that the AMPs identified above are acceptable to manage the applicable aging effects. Refer to Sections 3.1.1, 3.9.3, and 3.9.11 of this SER for the review of these AMPs.

3.3.6.3 Conclusion

The staff has reviewed the information in Sections 2.3.2.6 and 3.3 of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the emergency containment filtration system will be adequately managed so that there is reasonable assurance that this system will perform its intended functions in accordance with the CLB throughout the period of extended operation.

3.3.7 Containment Post Accident Monitoring and Control

3.3.7.1 Summary of Technical Information in the Application

The applicant describes its AMR of the containment post accident monitoring and control system for license renewal in Section 2.3.2.7, "Containment Post Accident Monitoring and Control " and Section 3.3 of the LRA. The staff reviewed these sections of the LRA to determine whether the applicant has demonstrated that the effects of aging associated with the containment post accident monitoring and control system will be adequately managed during the period of extended operation as required by 10 CFR 54.21(a)(3).

The containment post accident monitoring and control system includes the following subsystems: post accident hydrogen monitoring, containment pressure monitoring, post accident sampling, and containment air particulate and gas monitoring. A description of these systems are provided below.

The post accident hydrogen monitoring system provides indication of the hydrogen gas concentration in the containment atmosphere following a loss-of-coolant accident. The mechanical portions of the post accident hydrogen monitoring system provide a flow path from the containment to the hydrogen monitors and then back to the containment.

The containment pressure monitoring system consists of redundant containment pressure signals that are provided to isolate the containment and initiate several reactor safeguard actions. The mechanical portions of the containment pressure monitoring system provide sensing lines from the containment to the containment pressure monitors.

The only mechanical portion of the post accident sampling in the scope of license renewal is the sample cooler because it forms a part of the component cooling water pressure boundary. Component cooling water is described in UFSAR Section 9.3.

The post accident hydrogen control system provides the means for achieving and maintaining containment post accident hydrogen control. Post accident hydrogen control is described in UFSAR Section 9.12.

The containment air particulate and gas monitoring system measures radioactivity in the containment air. The mechanical portions of containment air particulate and gas monitoring provide a flow path from the containment to the monitors and then back to the containment. The containment air particulate and gas monitoring system is described in UFSAR Section 11.2.3.

The containment post accident monitoring and control components subject to an AMR include pumps and valves (pressure boundary only), orifices, piping, tubing and fittings. The intended functions for the containment post accident monitoring and control components subject to an AMR include pressure boundary integrity and throttling. A complete list of the containment post accident monitoring and control components requiring an AMR and the component intended functions are provided in Table 3.3-7 of the LRA.