CALVERT CLIFFS NUCLEAR POWER PLANT
INTEGRATED PLANT ASSESSMENT
METHODOLOGY VOLUME 2:
COMPONENT EVALUATION

BALTIMORE GAS & ELECTRIC COMPANY

LIFE CYCLE MANAGEMENT/LICENSE RENEWAL PROGRAM

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Attachments

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Attachment B, "Component Aging Evaluation Procedure: LCM-16" Rev 1, Change 0

Attachment C, "System and Structure Evaluation Results"

[For the 5/7/93 submittal, the Reactor Coolant System, the Compressed Air System and the Salt Water Cooling System Evaluation Results will be included.]

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1.0 INTRODUCTION

The purpose of Volume 2 of the Integrated Plant Assessment for Aging Methodology is to provide the bases for the Component Evaluation Task and the Component Aging Evaluation Task of the Baltimore Gas & Electric's Integrated Plant Assessment for Aging Process. Volume 1 of this methodology addresses how systems, structures and components are screened to determine whether they are important to license renewal (ITLR) or if they failed could prevent an ITLR function from occurring. Volume 2 describes the following tasks: 1) components which could not be subject to any aging unique to license renewal are dispositioned as requiring no further evaluation in the IPA process and 2) components which could be subject to such aging are analyzed in detail for the effects of that aging. The relationship of the tasks described in Volume 2 to the rest of the IPA is demonstrated in Figure I-1.

The purpose of Section 1 of this volume is to provide background information concerning the processes presented in this volume and describe the organization of Volume 2 of the methodology.

1.1 Background

The BG&E Integrated Plant Assessment process is based on the premise that the IPA should include a broad scope of equipment initially but should quickly focus on that equipment which may age differently during a license renewal term. Once the appropriate scope of long lived equipment is identified in each system, the effects of age related mechanisms on the functions of the components are determined and, where needed, effective means for managing the aging are evaluated.

The BG&E Component Evaluation task and Component Aging Evaluation task are applied on a system by system basis or on a number of similar systems simultaneously. The implementing procedures force evaluators to disposition component aging in a manner

consistent with the way identical or similar equipment is dispostioned in other systems whose evaluations were previously completed. There are several advantages to this approach over an evaluation strictly by commodity group:

- The manner in which components contribute ITLR system functions is more clearly incorporated into this approach.

- The effective programs for managing aging may be evaluated on a per system basis which is often the way such maintenance programs are organized.

- Since most LCM evaluations for reliability and availabilty are done on a system basis, a system IPA evaluation facilitates coordination of IPA work with other LCM evaluation tasks while commodity grouping evaluations do not.

1.2 Purpose

The purpose of Volume 2 of the Methodology is to: (1) provide the bases for the evaluation process, including the Component Evaluation and Component Aging Evaluation tasks; (2) communicate evaluation methodology concepts to those who are responsible for performing these tasks and (3) serve as a Source Document for other LCM Program Tasks and for general LCM Program Team training.

1.3 Methodology Summary

Volume 2 is divided into five sections. The contents of Sections 2.0 through 5.0 are summarized below.

Section 2.0, Component Evaluation Methodology Bases and Overview, introduces the bases for Volume 2 of the methodology. This

section provides definitions of important terms and acronyms that are used in Volume 2. The section also discusses the basic assumptions and initial conditions upon which this volume of the methodology relies and lists Source Documents which are used as references throughout Volume 2. Source Documents are characterized in the same hierarchy discussed in Section 2.0 of the IPA Methodology Volume 1.

Section 3.0, Component Evaluation, describes the various steps used to determine which components could not be subject to age related degradation unique to license renewal. Additionally, it includes steps to determine if plant maintenance practices for these components are adequate to ensure that the components will not be subject to age-related degradation unique to license renewal.

Section 4.0, Component Aging Evaluation, describes how the potential age related degradation mechanism list is developed, and how components are grouped based on design, material and function to facilitate the aging evaluation. It discusses how each applicable aging mechanism is evaluated for the component group to determine whether the effects of aging could prevent the performance of an important function or whether the aging is different in character or magnitude during the renewal term. Finally, the section describes the criteria used to determine that an existing plant program is effective in managing the aging or how to develop an effective program when one does not exist.

Section 5.0, Implementation Overview, introduces the basic approach that assesses and prioritizes modifications needed to make existing programs effective for managing aging. Where necessary it assesses and prioritizes development of new programs.

The following documents are attached to this methodology:

Attachment A, "Component Evaluation Procedure: LCM-10" Rev 2, Change 0

Attachment B, "Component Aging Evaluation Procedure: LCM-16" Rev 1, Change 0

Attachment C, "System and Structure Evaluation Results," [For the 5/7/93 submittal, the Reactor Coolant System, Compressed Air System and the Salt Water Cooling System Evaluation Results will be included in the submittal.]

Integrated Plant Assessment Flow Diagram

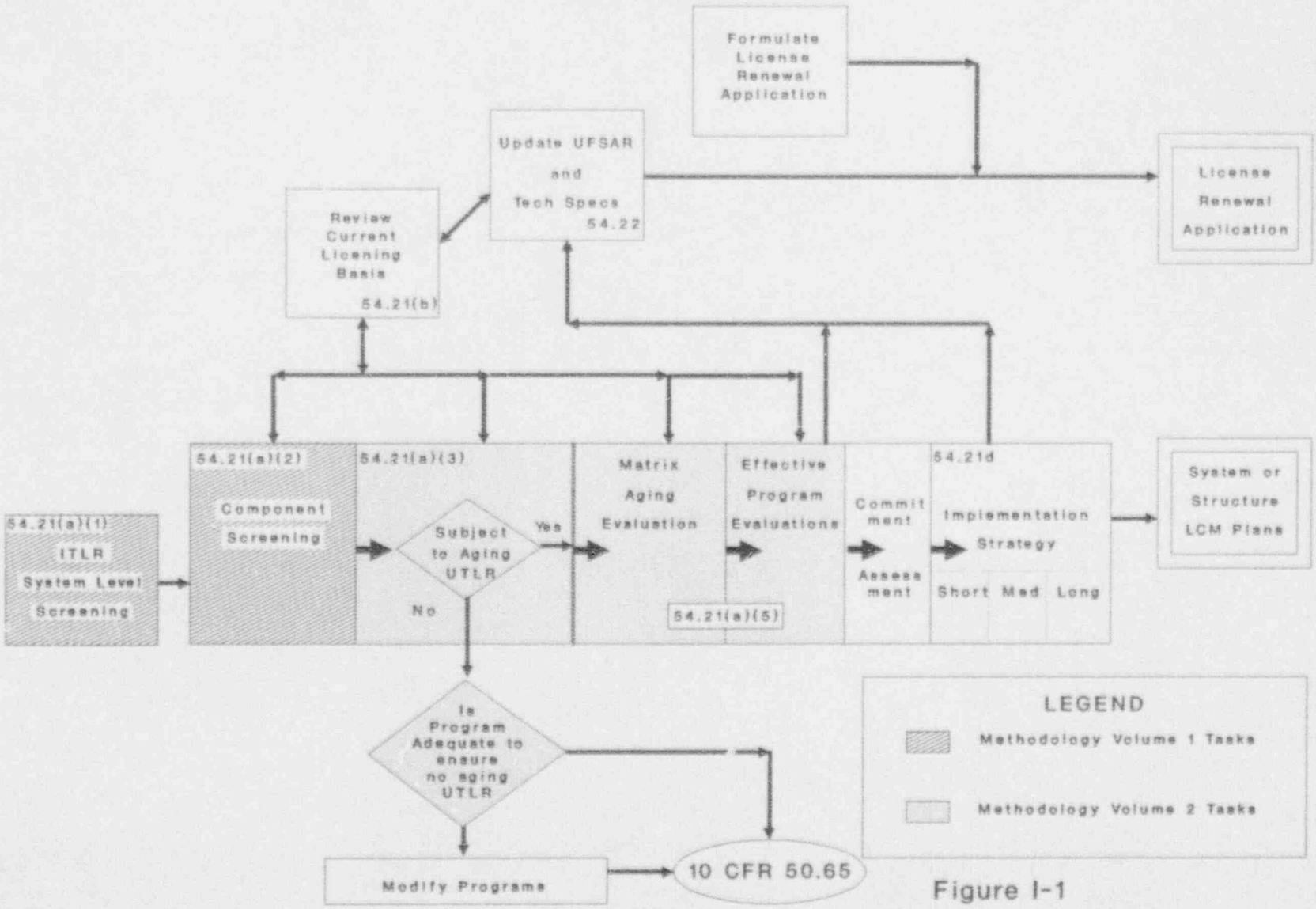


Figure I-1

2.0 COMPONENT EVALUATION METHODOLOGY BASES AND OVERVIEW

This Section defines the terms and acronyms (Subsection 2.1) that are used throughout Volume 2 of the methodology. Subsection 2.2 presents the assumptions and initial conditions upon which the methodology is based. Section 2.3 provides a brief overview of the evaluation process. Sections 3.0 and 4.0 of this Report present the details of the methodology.

2.1 Definitions

There are a number of defined terms and acronyms that are important to the LCM Program. Many of the following definitions and abbreviations, identified by *, are taken directly from the License Renewal Rule [2]:

> **1.(*) Aging Mechanisms** - The physical or chemical processes that result in degradation. These mechanisms include but are not limited to fatigue, erosion, corrosion, erosion/corrosion, wear, thermal embrittlement, radiation embrittlement, microbiologically induced effects, creep, and shrinkage.
>
> **2.(*) Age-Related Degradation** - A change in a system's, structure's, or component's performance or physical or chemical properties resulting in whole or part from one or more aging mechanisms. Examples of this type of change include changes in dimension, ductility, fatigue resistance, fracture toughness, mechanical strength, polymerization, viscosity, and dielectric strength.
>
> **3.(*) Age-Related Degradation Unique to License Renewal** - Degradation--
>
> (1) That occurs during the term of the current operating license but whose effects are different in character or magnitude after the term of the current

operating license (the period of extended operation); or

(2) Whose effects were not explicitly identified and evaluated by the licensee for the period of extended operation and the evaluation found acceptable by the NRC; or

(3) That occurs only during the period of extended operation.

4.(*) Effective Program (EP) - A documented program to manage age-related degradation unique to license renewal that ensures that a system, structure, or component important to license renewal will continue to perform its required function or will not prevent the performance of a required function during the period of extended operation.

5.(*) Integrated Plant Assessment (IPA)[2] - A licensee assessment that demonstrates that a nuclear power plant facility's systems, structures, and components important to license renewal have been identified and that age-related degradation unique to license renewal will be managed to ensure that the facility's licensing basis will be maintained during the renewal term.

6. Licensed Life - The maximum period of operations, in calendar years, as defined by statute. For CCNPP, this period is 40 years.

7. License Renewal (LR) - The process whereby a licensee performs Integrated Plant Assessments which define the measures in place or planned to address age-related degradation of SSCs. The NRC will evaluate and approve these measures and grant a renewal license. The term includes the licensee's collection and presentation of that information necessary to allow the NRC to renew the plant's operating license.

8. **Life Cycle Management (LCM)** - An integrated program to maintain the material condition of important systems, structures, and components through the current and any renewed license terms.

9. **Plausible Age-Related Degradation Mechanisms (ARDMs)** - An age-related degradation mechanism is considered plausible for a specific component if, when allowed to continue without any prevention or mitigation measures or enhanced monitoring techniques, it could not be shown that the component would maintain its capability to perform its intended safety function through the license renewal term.

   (1) ARDMs managed for a specific component by current plant programs - Those Component-ARDM combinations which are addressed by a program which takes those actions necessary to monitor, mitigate, and where possible, prevent the age-related degradation unique to license renewal of the component. Such management is designed to either prevent the conditions which cause or exacerbate the mechanism, or to ensure that the degradation of components will not progress to the point where the component's function is threatened prior to the performance of some remedial action.

   (2) ARDMs requiring further management - Plausible Component-ARDM combinations which are not fully addressed by current plant programs. As Component-ARDMs fall into this category, current programs will be augmented or new programs implemented to fully address the ARDMs for the components in question.

10. (*) **Renewal Term** - The period of time that is the sum of the additional amount of time beyond the expiration of the

operating license that is requested in the renewal application plus the remaining number of years on the operating license currently in effect.

11.(*) Systems, Structures, and Components (SSCs) Important to License Renewal (ITLR) - are:

(1) Safety-related SSCs, which are those relied upon to remain functional during and following design basis events to ensure:

(i) The integrity of the reactor coolant pressure boundary;

(ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or

(iii) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the 10 CFR Part 100 guidelines.

Design basis events are defined as in 10 CFR 50.49 (b)(1).

(2) All non-safety-related SSCs whose failure could directly prevent satisfactory accomplishment of any of the required functions identified in paragraphs (1) (i), (ii), or (iii) of this definition.

(3) All SSCs relied on in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

(4) All SSCs subject to operability requirements contained in the facility technical specification

limiting conditions for operation.

12. **Equipment Type** - A general categorization of components according to their function and design. Examples of specific equipment types are VALVE, PIPING, INSTRUMENT, etc. (For a complete listing of allowable equipment types, refer to reference [9].) During the Integrated Plant Assessment, the list of age-related degradation mechanisms which needs to be addressed is developed for each equipment type.

13. **Device Type** - A more specific categorization of components according to their function and design. Equipment types are broken into a number of device types. For example, the equipment type VALVE includes device types hand valve, check valve, control valve, and others. (For a complete listing of allowable device types, refer to reference [9].) Device types are the starting point for the grouping process in the aging evaluation task. Components are grouped by device type as they enter this task. Device types may be divided to form more specific groups if needed or the device type may define the component group for evaluation. Whenever the License Renewal Rule calls for justifications for structures and components (SCs), the discussions provided by the BG&E IPA process are at the device type level.

14. **Device Code** - The abbreviation for a device type. Each equipment identifier contains the device code to specify the device type of the component. For example, the identifier for steam generator number 11 is 1HX11. The device code "HX" designates that this component is a heat exchanger.

15. **Program/Activity (PA)** - A group of procedures, formal or otherwise, that provide reasonable assurance

that structures, systems, and components are capable of fulfilling their intended functions. This may range from a formalized, long established group of procedures to a one time only procedure. An example of the former is the Preventive Maintenance (PM) Program.

16. **Task** - A specific division of a PA which can generally be performed independently of all other items within the PA. An example of a Task is a specific PM Card.

17. **Subtask** - A part of a task. An example of a subtask would be one or more steps of a particular PM Card.

18. **Adequate Program** - A practice or activity that ensures replacement/refurbishment occurs before unacceptable performance can develop, contains specific criteria for replacement/refurbishment, and is documented by procedure. Presence of an adequate program ensures that aging unique to renewal cannot occur

19. **Maintenance Strategy** - A plan and vision of the level and type of maintenance that a component will receive throughout its life cycle. An effective maintenance strategy is defined by program attributes of discovery, assessment/analysis, corrective action, and documentation/confirmation.

20. **Program Attributes** - Practices and activities are characterized into these attributes to define an effective maintenance strategy for the component. The sum total of practices and activities may define the maintenance strategy for the component. These attributes ensure that the maintenance strategy is complete and the component will perform as expected. The four elements are

a. Discovery - The method of discovering performance or condition degradation is identified. The performance or condition degradation must have the characteristic that it will reveal itself or can be identified through the specified technique.

b. Assessment/analysis - Once performance or condition degradation is revealed, it must be compared to criteria or standards to determine the degree of the degradation. This could consist of operator judgement, documented engineering calculations or a variety of other means. Many times Discovery and Assessment/Analysis are contained in the same procedure.

c. Corrective action - When the degree of degradation is known, a specific corrective action can be determined. Generally, a corrective action will be defined in a separate procedure rather than in the Discovery or Analysis procedure. If the corrective action is simple like "replace the light bulb," then corrective action may not have procedural steps.

d. Confirmation/followup - After the corrective action is performed, post maintenance testing confirms that maintenance was performed correctly and the equipment performs its intended function. The corrective action is documented for future reference.

21. **Refurbishment** - A restoration of a component's ability to perform as intended. Generally, specific life-limiting sub-components are replaced or sub-components are restored to a satisfactory level of performance.

2.2 Assumptions and Initial Conditions

There are a number of assumptions and initial conditions for Volume 2 of the IPA Methodology. They include:

- Plant components which are subject to regular inspection or testing and are replaced or refurbished as a result of that inspection or testing could not be subject to age-related degradation unique to license renewal. The inspection or functional performance testing which governs component replacement or refurbishment ensures that component performance, and therefore component degradation, never reaches an unsatisfactory level. Controls under the Maintenance Rule ensure that if plant inspections or testing programs do not adequately control maintenance preventable functional failures, appropriate corrective action will be taken. The causes of abnormal failure rates, whether they be aging mechanisms, inadequate design, improper operation or some other reason will be corrected as part of the additional controls required under Part a.1 of the Maintenance Rule. Consequently such short lived components will never experience any age-related degradation which would be different in character or magnitude during the renewal period nor could they experience any new degradation mechanisms which only occur during the renewal period.

- It is only appropriate for licensees to evaluate aging specifically for the license renewal period and submit such an evaluation to the NRC if the aging is either different in character or magnitude during the renewal term or only occurs during the renewal period. For components which are replaced or refurbished as part of normal plant maintenance

practices, such evaluations would not be appropriate because this equipment is never intended to operate free of maintenance through the end of plant life.

- Components which require no effective aging management programs per 54.21.(a)(5)(ii) of the License Renewal Rule are those components where all applicable age-related degradation mechanisms are shown to either be non plausible (as defined in Section 2.1) or not unique to license renewal.

- Because the performance of the component evaluation process is essential for establishing the technical basis for renewal of the units' operating licenses, this process has been designated as safety-related. Applications of volume 2 of the IPA Methodology are performed in accordance with the applicable QA program.

2.3 Evaluation Methodology Overview

Volume 2 of the IPA methodology consists of Component Evaluation and Component Aging Evaluation, each of which is divided into a number of steps. Figures 2-1 and 2-2 graphically depict the logic flow of the two tasks covered in Volume 2 of the IPA Methodology. Figure 2-1 depicts the Evaluation task and Figure 2-2 depicts the Component Aging Evaluation Task.

2.3.1 Component Evaluation

The Component Evaluation Task uses the results of the component level ITLR screening task for the system or systems being evaluated. The primary objective of the task is to determine whether components could be subject to age related degradation unique to license renewal. The

task accomplishes the following steps which are described in detail in Section 3:

- Determine if component are subject to replacement or refurbishment programs.
- Perform a plant programs adequacy check.

2.3.2 Component Aging Evaluation

The Component Aging Evaluation Task addresses the components from the Component Evaluation task which are potentially subject to age-related degradation unique to license renewal. The primary objective of this task is to determine which age-related degradation mechanisms need to be addressed by an effective plant program and to assess the effectiveness of existing plant programs to manage that aging. The following steps are performed in this task:

- Create a potential ARDM list.
- Group components.
- Create and resolve the ARDM matrix.
- Evaluate effectiveness of existing programs.

2.3.3 Implementation

The Implementation task of the IPA process receives three types of recommendations from the IPA evaluation tasks:

- Changes to plant programs to make them effective aging management programs.

- Changes to plant programs to make them adequate for ensuring that no degradation unique to

license renewal could occur to components covered by the programs.

- New programs to effectively manage plant aging.

Additionally, other LCM evaluations conducted outside the scope of the IPA may provide additional options. For example, cost benefit analysis of equipment replacement alternatives may provide information to help decide whether to continue to maintain existing components or to upgrade the design of the components. These recommendations are reviewed and prioritized in the Implementation Task. An overview of this task is presented in Section 5.

Component Evaluation Flow Chart

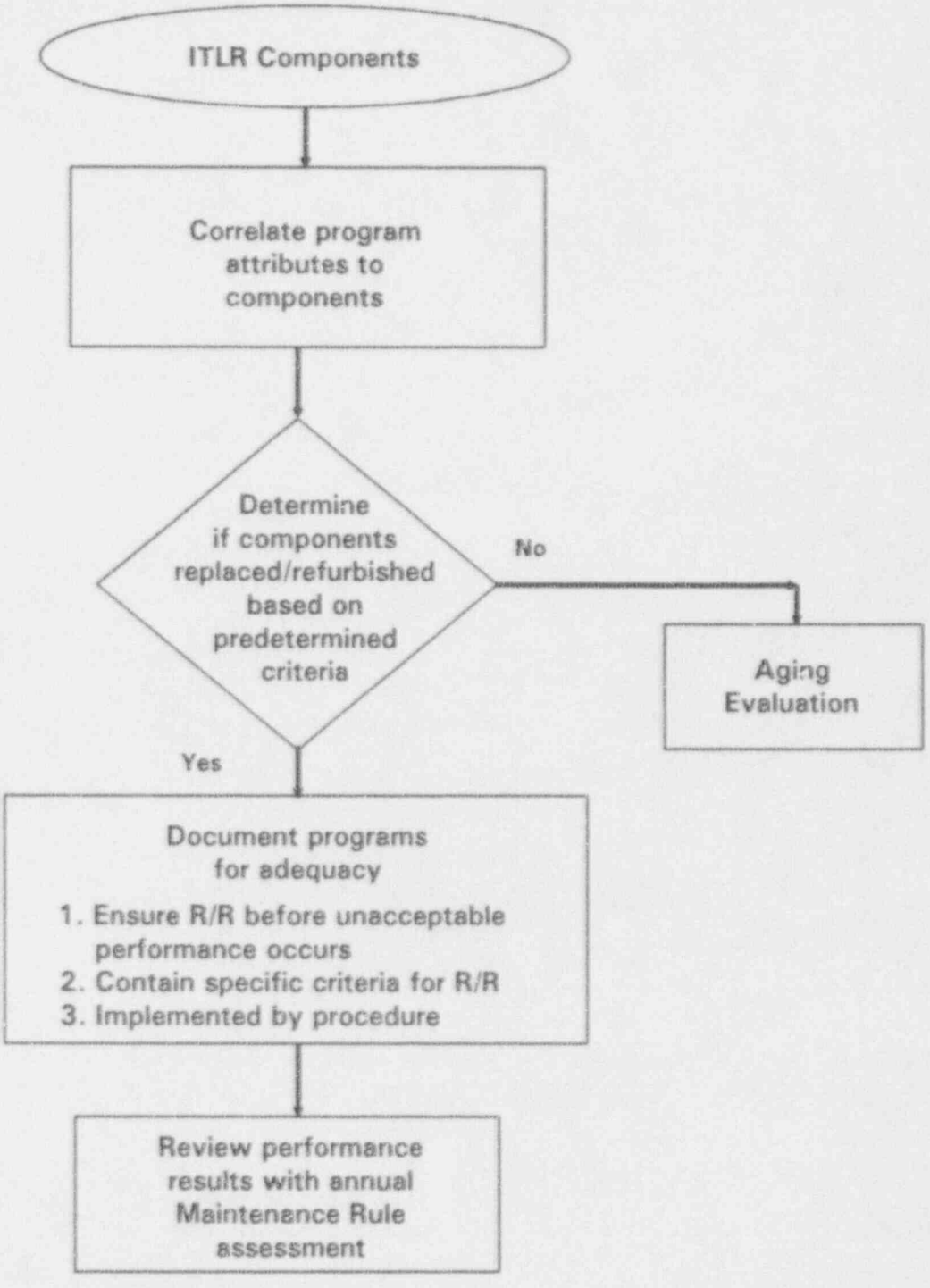


Figure II-1

Aging Evaluation Flow Chart

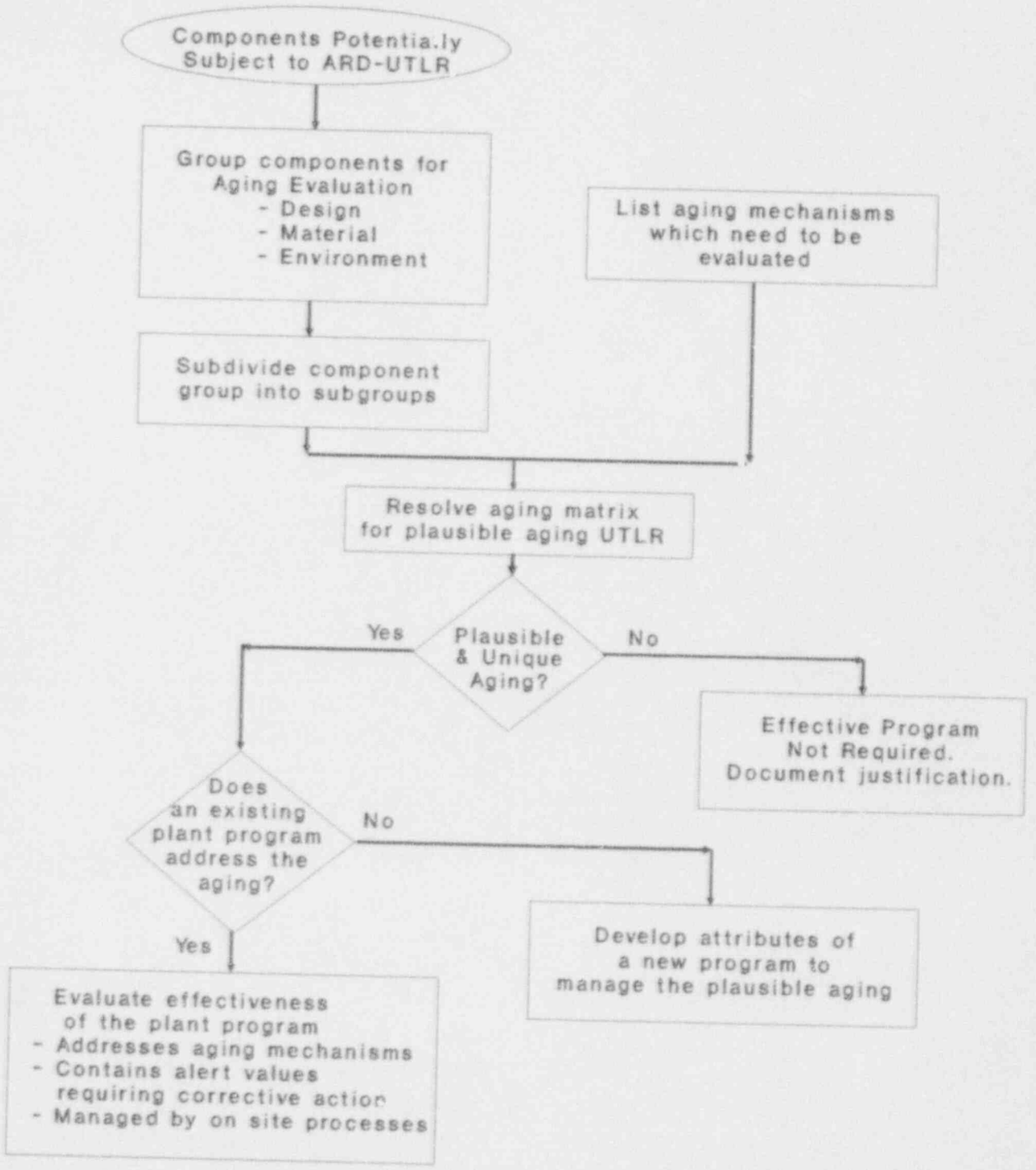


Figure II-2

Table 2-1

Source Documents

See Table 2-1 from Volume 1 for additional related source documents. Only references specific to Volume 2 are listed below:

1. "Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses", Draft NRC Regulatory Guide No. DG-1009, dated December 1990.

2. "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants", Draft NUREG No. 1229, dated November 1990.

3. 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" on the Federal Register Vol. 56, No. 132, July 10, 1991.

4. NUMARC white paper "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" dated July 1992

5. NUREG-1377 Listing of Nuclear Plant Aging Research Reports and the reports themselves

6. Industry Technical Reports on PWR Reactor Vessel, PWR Reactor Vessel Internals, PWR Containment, PWR Reactor Coolant System, Class 1 Structures and Environmentally Qualified Cables in Containment.

7. NUMARC White Paper "Final Report on Integration of the License Renewal and Maintenance Rules" dated November 1992

8. "Industry Point Paper on the License Renewal Issues Delineated in the Commission's December 21, 1992 Staff Requirements Memorandum" dated January 22, 1993

9. Design Database Unit Procedure 1 Control of the Master Equipment List, Attachment D.

3.0 COMPONENT EVALUATION

This Section describes how the ITLR components from the Component Level Screening task are evaluated to determine if they could be subject to age related degradation unique to license renewal (ARD-UTLR). This task is governed by Step 54.21.(a)(3) of the license renewal rule:

(a) Integrated plant assessment (IPA). The IPA must:

(3) For those SCs identified in paragraph (a)(2) of this section, identify the SCs that could have age-related degradation that is unique to license renewal.

10 CFR 54.21(a) allows the IPA process to be exited without performing a detailed aging evaluation for components which could not be subject to any ARD-UTLR. The steps of the Component Evaluation task implement specific criteria for making this determination.

3.1 Components Subject to a Replacement/Refurbishment Program

3.1.1 Development and Justification of the Criteria

The approach taken at this step of the Component Evaluation process is to identify a set of components which could not have age related degradation unique to license renewal and which therefore need not be addressed further in the IPA process. This step does not attempt to identify all components which do not have ARD-UTLR. Instead it identifies a concrete set of criteria which is relatively straightforward to implement for a group of components and which will always indicate that the components could not be subject to aging unique to license renewal.

Age-Related Degradation Unique to License Renewal

Degradation--

(1) That occurs during the term of the current operating license but whose effects are different in character or magnitude after the term of the current operating license (the period of extended operation); or

(2) Whose effects were not explicitly identified and evaluated by the licensee for the period of extended operation and the evaluation found acceptable by the NRC; or

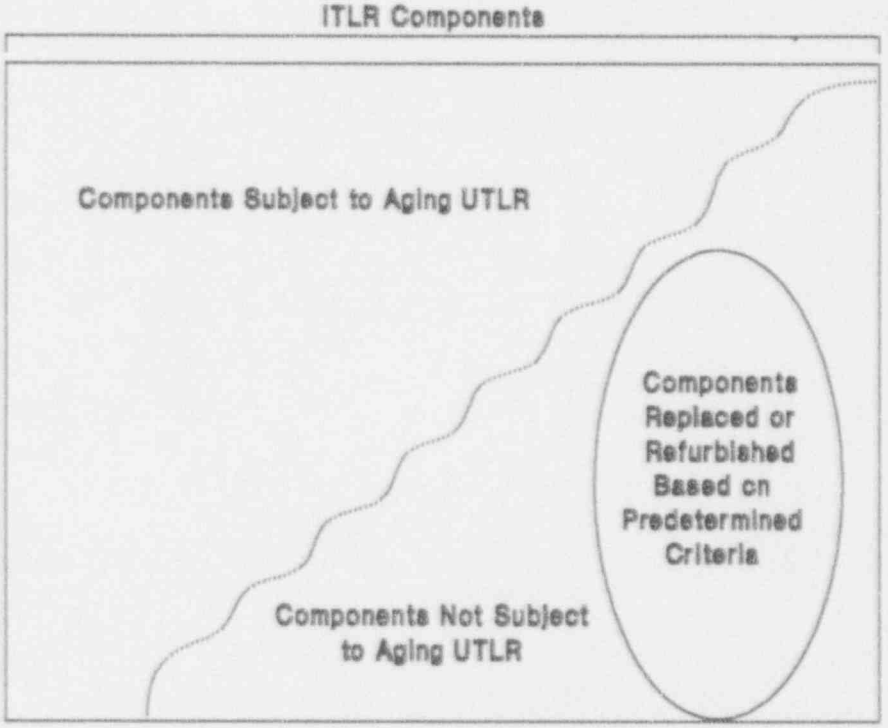
(3) That occurs only during the period of extended operation.

3.1.1.1 Development of the Negation of ARD-UTLR

The definition of age related degradation unique to license renewal is provided in Section 2.1 and repeated above for convenience. Note that meeting any of the three conditions above would be sufficient to show that age related degradation is unique to license renewal. Because the definition as written is somewhat vague, the decision was made not to determine for every ITLR component in the system whether it is or is not subject to ARD-UTLR. Rather, it is assumed that components are subject to such aging unless it can be shown that the opposite is true. This is a conservative approach because components which are potentially subject to ARD-UTLR are the ones which are evaluated further in the IPA.

To implement this approach, a set of criteria was developed which, if satisfied for a group of components, would always show that the components could not possibly be subject to ARD-UTLR. Since the IPA process will continue for all components which do not meet this criteria, it is beneficial to formulate such

criteria to capture as large a portion of the full set of components not subject to ARD-UTLR as possible. However, the process remains rigorous even if the criteria chosen does not encompass the full set of such components. Figure III-1 provides a Venn diagram which depicts the relationships between these sets of components.



Components Not Subject To Aging Unique to License Renewal
Figure III-1

Because the intent of this step of the process is to show that there could be no degradation unique to license renewal, the negation of the UTLR definition represents conceptually the criteria which need to be demonstrated. Therefore the negation of the definition is shown below.

There could be no Age-Related Degradation Unique to License Renewal for a component if

(1) The effects of all age related degradation of the component will be no different in character or magnitude after the term of the current operating license than it is during the current license term;
and
(2) If any aging effects for the component were explicitly identified and evaluated by the licensee for the period of extended operation, then the evaluation has been found acceptable by the NRC;
and
(3) No degradation mechanisms have been found for the component which occur only during the period of extended operation.

3.1.1.2 Development of an Identifiable Subset of Components not Subject to ARD-UTLR

Paragraphs 1), 2) and 3) below address the corresponding criteria in the "Not UTLR" definition shown above. These paragraphs show that if a component is subject to inspection or testing and is replaced or refurbished based on predetermined criteria, all of the three conditions of the "Not UTLR" definition will be satisfied.

1) Components which are subject to regular inspection or testing and are replaced or refurbished based on predetermined criteria associated with the inspection or testing will never experience any degradation which is different in character or magnitude during the renewal period because:

(a) The "magnitude" of aging is controlled by the inspection or functional performance testing which governs component replacement or refurbishment activities. These activities ensure that component performance, and therefore component

degradation, never reaches an unsatisfactory level. Controls under the Maintenance Rule ensure that if plant inspections or testing programs do not adequately control maintenance preventable functional failures, the underlying causes of the abnormal failure rates will be determined. These causes, whether they be aging mechanisms, inadequate design, improper operation or some other reason will be addressed as part of the appropriate corrective actions required under Part a.1 of the Maintenance Rule.

(b) The "character" of the aging is unaltered because the factors which govern age related degradation (i.e. equipment design, environment and function) remain constant regardless of the period of operation. Any plant modification which would result in a different function, design or operating environment for a component have been evaluated under the requirements of 10 CFR 50.59 in accordance with the normal plant modification process. Programs for components which are regularly inspected or tested and replaced or refurbished based on predetermined criteria are sufficient to ensure that the stressors affecting equipment aging do not change. Therefore, their aging is not different in character during the renewal period.

2) For components which are subject to regular inspection or testing and are replaced or refurbished based on predetermined criteria, a licensee would not have explicitly identified or evaluated the affects of aging for the renewal period since it has been shown above that these effects would be no different than they are during the current license term. Since this

equipment was never intended to operate free of maintenance throughout plant life, no evaluations of aging during extended operation was necessary. Therefore no evaluation was available to be found acceptable to the NRC.

3) For components which are subject to regular inspection or testing and are replaced or refurbished based on predetermined criteria, there could not be any degradation mechanisms which occur only during the renewal period because the factors which cause age related degradation (i.e. equipment design, function and environment) remain unchanged during the renewal period for such components, as discussed in paragraph 3.1.1.2 1)(b) above.

The conclusion which can be drawn from the above discussion is that the set of equipment which is subject to regular inspection or testing and is replaced or refurbished based on predetermined criteria is a subset of the equipment which is not subject to aging unique to license renewal. Therefore, satisfying the "subject to regular inspection ..." criterion is sufficient to show that a component could not be subject to age related degradation unique to license renewal.

3.1.2 Application of the Criteria

This step of the task reviews the list of ITLR components and the important system level ITLR functions to which they contribute. This list is sorted according to device type to facilitate processing. (See Section 2.1 for a definition of "device type.")

The components in the device type are first checked to determine if they are currently scheduled for replacement. If a component is scheduled for replacement with a item of a different design, the IPA process will be applied to the new equipment. If not, the process continues on the as-installed components.

Next the plant programs which apply to a device type are reviewed to determine if they require activities to regularly inspect or test the components of the device type and require component replacement or refurbishment if predetermined criteria exceed a threshold value. If so, the programs are targeted for a program adequacy check in the next step of this task. If the components in the device type are not regularly inspected or tested, or the inspections or tests which do apply to the components are not the type which direct replacement or refurbishment activities, the components in the device type proceed to the Component Aging Evaluation task.

When components in a device type that has been evaluated previously are encountered in the Component Evaluation task, a review of these previous results is conducted, instead of proceeding directly to a review of the programs associated with the components. The purpose of the review of previous results is to determine what the maintenance strategy is for similar components in the plant. If all the components in this device type in previous results are found to be replaced or refurbished based on predetermined criteria, it is likely that the similar components in the system being evaluated are subject to a comparable maintenance strategy. Consequently, programs associated with the device type being evaluated are reviewed to locate one which corresponds to a program

in a previous evaluation which was determined to adequately prevent components from being subject to ARD-UTLR. For example, if a motor overhaul program was located for a 4160V motor in a previous system, the evaluator would suspect that a 4160V motor in the system being evaluated might also have an overhaul program. The evaluator would attempt to locate such a program and if successful would tentatively disposition the motor as not subject to aging UTLR. Again, the final determination that the motor is not subject to age-related degradation UTLR would occur after the adequacy review of the overhaul program is complete.

In like manner, if all components of the same device type were determined to be potentially subject to ARD-UTLR in previously completed evaluations, the similar components in the system being evaluated are dispositioned in the same manner and added to the components which will be evaluated in the Component Aging Evaluation task.

The results of this step of the Component Evaluation task is an initial list containing components which are potentially subject to ARD-UTLR. These components will be further evaluated in the Component Aging Evaluation task. For each of these component device types, similar aging evaluations performed in previously completed evaluations are referenced in order to facilitate the aging evaluations on the current system and to ensure consistency in evaluation results.

The Component Evaluation task also produces a list of components subject to inspection or testing and replaced or refurbished based on predetermined criteria. For components on this list, the final determination is made as to whether they could not be

subject to ARD-UTLR during the program adequacy review which is described in the next section.

3.2 Plant Program Adequacy Check

The program adequacy check evaluates the program against rigorous performance/results criteria to ensure that the components will be replaced or refurbished before they are subjected to ARD-UTLR. To be rigorous in this evaluation, criteria similar to that of the effective program evaluation are specified. However, the criteria are specified in terms of performance and results instead of management of age-related degradation mechanisms.

Paragraph 54.21(a)(6) of the License Renewal Rule specifies the following characteristics of an effective program.

Effective programs must:

(i) Ensure identification and mitigation of age-related degradation unique to license renewal for the SSCs identified pursuant to paragraph (a)(3) of this section; and
(ii) Contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met;, and
(iii) Be implemented by facility operating procedures and reviewed by the on-site review committee.

In order to perform a rigorous adequacy check, these three effective program criteria have been revised in terms of performance and results instead of management of age-related degradation mechanisms:

(i) Adequate programs must ensure that the SSCs identified as ITLR will be replaced or refurbished before they are subject to age related degradation that is unique

to license renewal; and
(ii) Adequate programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met; and
(iii) Adequate programs must be implemented by facility operating procedures and reviewed by the on-site review committee.

The first step of the adequacy check is to characterize all of the maintenance activities (PAs or Tasks) associated with the component(s) into a maintenance strategy. Generally there are many types of programs associated with the component(s). These programs ensure that ARD-UTLR does not occur through performance and condition monitoring. Plant programs at Calvert Cliffs are listed in Table 3-1.

Table 3-1: Plant Programs

Maintenance (Preventive) - The PM program ensures that routine periodic maintenance is performed on a variety of plant equipment. The procedures are invoked as part of the maintenance work order process.

Maintenance (Corrective) - Corrective maintenance is rework or restoration activities of plant equipment that has failed or is malfunctioning and is not performing its intended function.

Maintenance Standards Program - Controlled documents addressing a specific manufacturer model or model group used to specify critical characteristics, failure history and applicable maintenance tasks. These documents represents an implementation vehicle for Reliability Centered Maintenance recommendations.

Check Valve Reliability - A combination of predictive and preventive maintenance practices to monitor and test check valve performance and increase reliability. Design, performance and monitoring data are collected and used for reliability and failure trending, establishing monitoring frequencies, and improving check valve reliability.

Eddy Current Testing - One of the non-destructive methods of examination used to determine degradation of materials such as heat exchanger tubes.

Electronic Cable Degradation (ECAD) - ECAD is an electrical test program to measure cable degradation. It also can be used to diagnose insulation resistance.

Table 3-1: Plant Programs (cont'd)

Engineering Test Procedures (ETP) - Engineering Test Procedures could include such things as equipment or system evaluation/troubleshooting, performance testing, and special testing of elaborate nature not covered by other programs or existing procedures. They are for one time use only or setup as a repetitive task under a PM.

Surveillance Test Procedures - Tests are performed at specific intervals to satisfy Technical Specification Surveillance requirements which specify certain tests, calibrations or inspections to assure that , 1) the necessary quality of systems and components is maintained, 2) the facility operation will be within safety limits, and 3) the limiting conditions for operation will be met.

Environmental Qualification - The EQ Program encompasses such things as procurement activities, replacement parts, disposition of EQ deviations, quality assurance and quality control, modification to EQ equipment, control of as built configuration and documentation, assessment of component replacements with different configurations, equipment maintenance and documentation of same, equipment condition monitoring, design bases, documentation of equipment qualification, and engineering review associated with environmentally qualified equipment. EQ maintenance requirements are defined on Qualification Maintenance Requirements Sheets (QMRS).

Fatigue Monitoring - Plant transients are monitored and cycles are counted for tracking fatigue usage in critical areas of the NSSS System.

Functional Test Procedures (FT) - Functional tests are activities performed on permanent plant equipment at CCNPP. Functional tests may be used for periodic calibration, corrective maintenance, post maintenance testing, initial equipment checkout, and preventive maintenance.

In-Service Inspection (ISI) - In-service inspection is required to meet the applicable codes and standards for nuclear power plants. (requirements of 10 CFR 50 and Nuclear Power Plant Technical Specification for in-service inspection) Does not apply to repairs and replacements, pump and valve in-service testing or snubber testing.

Loose Parts Monitoring - An accelerometer monitors the vibration on the reactor vessel and steam generator at various points and if a spike occurs, a chart recorder begins to monitor vibration.

Lube Oil Analysis - For various components samples are taken at different locations. They are sent to an oil test lab for analysis and the results trended in a database.

Materials Testing and Evaluation - Detailed testing and evaluations of specific materials is performed as a support activity upon request to address reoccurring problems and to support procurement.

Motor Operated Valve Program - This program was formed in response to Generic Letter 89-10 which called for the verification of the design basis. Several initial calculations were done and the design bases of the MOV were updated.

Performance Evaluation Program (Operations) - Routine operational checks of equipment during normal plant operations.

Table 3-1: Plant Programs (cont'd)

Plant Layup and Equipment Preservation - Program requirements and responsibilities are established to ensure that all major plant systems and components are adequately preserved during periods of non-service, the regulatory requirements for installed equipment preservation are met and that layup activities are documented to ensure regulatory compliance and to support plant life extension efforts.

Post-Maintenance Testing - Requirements for testing equipment after maintenance but before returning the equipment to service.

Pressure Test Procedures (PTP) - A system hydrostatic and leakage testing program. Testing performed in accordance with this program may also be used to satisfy post-maintenance testing requirements as required by ASME Section XI.

Protective Coating and Painting - This program pertains to the initial application and reapplication of protective coatings and paints on plant equipment and the structure containing this equipment at Calvert Cliffs.

Thermography - An infrared heat detection system used mainly on request to determine condition of electrical equipment such as motor control centers, 500kv transmission connections, transformers, and occasionally used to detect leaking relief valves.

Vibration Monitoring - The program encompasses vibration monitoring of all critical plant rotating machinery. The program fulfills the vibration monitoring requirements for the Plant Preventative Maintenance Program.

Thermal Performance Monitoring - Thermal performance is monitored regularly to detect imbalance in equipment performance. Periodically specific equipment such as heat exchanges are monitored to determine causes of imbalances such as moisture carryover from the steam generators.

An adequate maintenance strategy consists of the following elements:

(1) Discovery - The method of discovering performance or condition degradation is identified. The performance or condition degradation must have the characteristic that it will reveal itself or can be identified through the specified technique.

(2) Assessment/Analysis - Once performance or condition degradation is revealed, it must be compared to criteria or standards to determine the degree of the degradation. This

could consist of operator judgement, documented engineering calculations or a variety of other means. Many times Discovery and Assessment/Analysis are contained in the same procedure.

(3) Corrective Action - When the degree of degradation is known, a specific corrective action can be determined. Generally, a corrective action will be defined in a separate procedure rather than in the Discovery or Analysis procedure. If the corrective action is simple like "replace the light bulb," then corrective action may not have procedural steps.

(4) Confirmation/Documentation - After the corrective action is performed, post maintenance testing confirms that maintenance was performed correctly and the equipment performs its intended function. The corrective action is documented for future reference.

Once the maintenance strategy is characterized, the three adequate program criteria are applied by translating the criteria into a series of questions to be asked concerning the PAs or Tasks in the maintenance strategy. These questions are based on the keywords in the three criteria.

The keywords in the first criteria are "replace" and "refurbish".

(i) Adequate programs must ensure that the SSCs identified as important to license renewal and that contribute to the performance of a required function, or could, if they fail, prevent an SSC important to license renewal from performing its required function will be replaced or refurbished before they are subject to aging unique to license renewal.

The keywords "replaced" and "refurbished" are translated into the questions:

Is the Discovery PA or Task frequency interval less than the shortest known failure time?

Does the PA or Task demonstrate historically that it is effective in maintaining the important function(s) for the identified grouping (i.e. the component failures have not caused ITLR system functional failures prior to replacement?)

Historically, have maintenance preventable ITLR System functional failures been detected by the PA or task?

The keywords in the second criteria are "acceptance criteria" and "timely corrective action".

(ii) Adequate programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.

The keywords "acceptance criteria" and "timely corrective action" are translated into the questions:

Does the PA or Task have an action or alert value or condition parameter to determine the need for corrective action?

Does the action value or condition provide sufficient indication of degradation to reasonably conclude that there will not be an ITLR System functional failure prior to the next PA or Task?

Does the PA or Task ensure that appropriate corrective action is taken?

Does the corrective action documented in the PA or Task receive proper work prioritization; i.e. scheduled and completed on schedule, or positive alternative action identified?

Does the PA or Task have a confirmation process that ensures corrective action is taken?

The keywords in the third criteria are "implemented" and "reviewed".

(iii) Adequate programs must be implemented by facility operating procedures and reviewed by the on-site review committee.

The keywords "implemented" and "reviewed" are translated into the question:

Does the PA or Task have a process for review, revision and approval?

These questions are answered by referring to the maintenance strategy, operational experience, maintenance history, and test results. All questions must to answered in a positive manner for the maintenance strategy to be considered adequate. Any question with a "no" answer must have a PA or Task modification specified which will ensure the maintenance strategy is adequate. If such a modification is not possible, the associated component group must undergo an aging evaluation in the next step of the IPA. Program modifications associated with the negative responses become recommendations for implementation in the Implementations Task of the IPA process.

The program adequacy check is intended as a rigorous demonstration, for license renewal application purposes, to show that the maintenance strategy employed will ensure that these

components are replaced or refurbished before any aging unique to renewal will occur. The documentation associated with this one-time demonstration provides a reference for the Maintenance Rule Program. The monitoring and goal setting aspects of the Maintenance Rule Program ensure continued satisfactory performance of these components.

4.0 COMPONENT AGING EVALUATION

This Section of the Component Evaluation Methodology describes how the components which were determined in Section 3.1.2 to be potentially subject to ARD-UTLR are evaluated for the effects of that aging. It also includes the evaluation of plant programs which address aging to determine whether they are effective as defined in Section 2.1 of this methodology. This task is governed by Steps 54.21(a)(5) and (6) of the license renewal rule:

> *(a) Integrated plant assessment (IPA). The IPA must:*
>
> *(5) For each SC identified in paragraph (a)(3) of this section, demonstrate that the age-related degradation unique to license renewal:*
>
> *(i) Is addressed through an effective program, or*
>
> *(ii) Need not be addressed in an effective program.*
>
> *(6) Describe the applicable effective programs for each SC identified in paragraph (a)(5)(i) of this section, and demonstrate that these programs will be effective in maintaining the CLB during the period of extended operation. The evaluation of these programs shall include a review of the CLB as appropriate. Effective programs must:*
>
> *(i) Ensure identification and mitigation of age-related degradation unique to license renewal for the SCs identified pursuant to paragraph (a)(3) of this section; and*
>
> *(ii) Contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met; and*
>
> *(iii) Be implemented by the facility operating procedures and reviewed by the onsite review*

committee.

10CFR54 specifies that age-related degradation unique to license renewal must be managed by effective plant programs or justification provided as to why the aging need not be managed. This task evaluates each applicable aging mechanism for a component group. A determination is made that either the ARDM is not plausible or not UTLR and therefore does not need to be managed or the ARDM is plausible and potentially unique. In the latter case, a determination is made that the ARDM is either already being managed by an effective plant program or recommendations are provided for modifying existing programs or creating new programs to effectively manage the ARDM. The Component Aging Evaluation is divided into four distinct steps which are described in this section.

4.1 Creating a Potential ARDM List

The first step of the evaluation is to determine which ARDMs must be evaluated for the various equipment types which have been identified as being subject to ARDMs potentially UTLR for the given system. When an equipment type is encountered which has not been evaluated as part of a previously evaluated system, the potential ARDM list must be created from scratch. In this case, the draft Regulatory Guide on the Format and Content of License Renewal Applications [1], Industry Technical Reports for License Renewal [6], Nuclear Plant Aging Research Reports [5], and other industry documents are relied on to determine the aging mechanisms which need to be considered for each equipment type. These reference materials are reviewed and a list is compiled of all of the ARDMs which might affect any component of the given equipment type. Also included in the listing is a discussion of the various stressors which cause or exacerbate the ARDMs as well as any characteristics of selected components which might prevent the occurrence of the ARDMs. This list is designated as the "Potential ARDM List" for the equipment type. This Potential

ARDM List becomes the master list of ARDMs to be considered for future evaluations of components of this type.

When components are encountered which are of the same equipment type as components previously evaluated in another system, this step utilizes the Potential ARDM List which was created and updated in previous evaluations. Any new ARDMs which are applicable to components of the equipment type in the system being evaluated are added to the Potential ARDM List as it is applied to this new system. These new potential ARDMs are available for consideration in future evaluations for the equipment type. In this manner, components of the same equipment type, regardless of the system to which they belong, start with a common list of ARDMs to be considered[1].

Whether the initial potential ARDM list was started from scratch or results from a previous evaluation were used, the next step is to eliminate from consideration those ARDMs which are clearly not applicable to any of the components of the given equipment type in the system being evaluated. The ARDMs on the Potential ARDM List are reviewed with respect to the scope of the system being evaluated. The mechanisms which might be applicable to some components of the given equipment type but which do not apply to any of the components in the system being evaluated are annotated on the list as not applicable for the given system. For example, creep is an ARDM which would be included on the initial list for the equipment type "piping." However, when finalizing the potential ARDM list for a service water system, this ARDM would be eliminated as not applicable because the temperatures throughout the service water system do not warrant consideration of this mechanism. The basis for marking this ARDM as not

[1] Theoretically, ARDMs added to the potential ARDM list should not be applicable to components of the same equipment type from previous evaluations because these ARDMs were unique to components in the system being evaluated. However, if an ARDM is encountered which should have been considered in a previous evaluation but was not, the Technical Problem Report process is used to document such inconsistencies and direct actions to resolve them.

applicable is also recorded on the Potential ARDM List.

4.2 Component Grouping

If a system contains several components with similar characteristics, it adds efficiency to the evaluation process when these components can be grouped together for a common evaluation. This step of the Component Aging Evaluation task accomplishes that grouping.

The components of a system are all classified in the Site Equipment Database with a particular device type code. Examples of such device types are hand valves, check valves, pressure transmitters and heat exchangers. (A complete list of all device types is contained in Reference [9].) Consequently, before this task even begins a grouping of components is already accomplished to some degree. This grouping, consisting of all of the components of a given device type, is the least selective group which may be evaluated in this task.

Frequently, the evaluator will find other groupings within a device type so that the components of the device type are further divided to facilitate the evaluation process. For example, if the check valves of a particular system are made of two distinctly different materials, the evaluator may choose to form two separate groups for these valves. In this example, the grouping attribute chosen is "material of construction." Other possible grouping attributes are illustrated below:

Function - MOVs which only serve a pressure boundary function may be included in one group and those which must actually stroke for an ITLR function may be in another.

Interval Environment - All piping which carries salt water may be in one group while the instrument air piping

which controls valves in the system would be in another.

External Environment - All underground piping may be included in one group, while the above ground piping may be in another.

Design - Other design parameters besides material could be selected as grouping attributes. Plate and frame heat exchangers may be grouped separately from shell and tube heat exchangers.

Flexibility is allowed within the guidelines described above for the evaluator to choose the most efficient grouping process for a given system. Whatever method is chosen, the grouping attributes and the component IDs which make up the group are recorded on a grouping summary sheet. Each group is assigned a Group ID which contains the system number, device type code and a sequential number.

Once component groups are established, the evaluator may choose to subdivide the components of the group into subgroups. These subgroups would contain the subcomponents of the individual components which make up the group. Some component groups contain complex components consisting of many different parts. They may be made of a different material, may be subject to a different environment and/or be called on to contribute to different component functions. The step to subdivide component groups into subgroups is necessary in order to make the process of evaluating aging mechanisms for such complex components a more manageable task.

For example, if a component group contains eight reactor coolant pumps, the evaluator would likely choose to subdivide this group into a number of subgroups. One subgroup may contain all the pump casings, while another would contain all pump shafts. Still

another may include the pump impellors for all eight pumps. Because these subcomponents are the same for all reactor coolant pumps, they remain grouped with the corresponding subcomponents of the other reactor coolant pumps. Because they are likely to age differently than other subcomponents, they are subdivided into the subgroups and evaluated individually in the aging matrix.

When groups are subdivided into subgroups, two further checks are performed which correspond to steps of the IPA at the component level. First, subgroups which contain subcomponents which do not contribute to the ITLR function(s) are screened out and do not require further evaluation. For example, if a group of MOVs has only a pressure boundary function, the subgroups containing the valve stems, discs and seats would be screened out as not contributing to the pressure boundary function.

Additionally, if a subgroup is made up of subcomponents which are regularly inspected or tested and are replaced or refurbished based on predetermined criteria, these subcomponents are designated as not subject to ARD UTLR for the same reasons described at the component level. The replacement/refurbishment program which governs this maintenance strategy is then fed into the program adequacy evaluation described in Section 3 to evaluate whether the program adequately ensures that subcomponents would be replaced or refurbished before they would be subject to ARD UTLR. An example of a subcomponent which is not subject to ARD UTLR because of a replacement program is the reactor coolant pump seal. The reactor coolant pump subgroup which contains these seals is not included in the aging matrix.

Whenever component groups are subdivided, this process is documented on a subcomponent information form. Each subgroup is assigned an ID number consisting of the group ID and a letter suffix. If subgroups are eliminated from further evaluation because they do not contribute to the ITLR function(s) of the

components in the group or because they are not subject to any ARD UTLR, the bases for these decisions are also documented on this form.

4.3 Create and Resolve the ARDM Matrix.

After completion of the potential ARDM list and after components are properly subdivided and grouped, the aging matrix may be created and evaluated. The aging matrix consists of all potential ARDMs along the Y axis and all subgroups for a particular component group along the X axis. Each ARDM/subgroup intersection must be considered and resolved during this step.

For each ARDM/subgroup combination, the evaluator considers whether the ARDM could affect the material which the subcomponents in the subgroup are made of. If the material is not affected by the given ARDM, the ARDM is said to not be plausible for the subcomponents of the subgroup. Additionally, for each ARDM/subgroup combination, the environment in which the subgroup is designed to operate is considered. If the mechanism is not perpetuated by the particular environment, the ARDM is designated as not plausible for the subgroup. Finally, the function(s) which must be performed by the subgroup are considered. If the ARDM could not affect the required function(s) of the subcomponents in the subgroup, the ARDM is designated as not plausible for the subgroup. Although material, environment and function are mentioned separately above as factors which might cause an ARDM to be designated as not plausible, all of the factors are also considered together.

If an ARDM cannot be shown to be non plausible for a subgroup, the evaluator may attempt to show that the ARDM is no different in character and magnitude during a renewal period and therefore the ARDM would not be unique. An example of such a case would be when the stressors which cause the ARDM are all reset to predetermined values periodically during the original license

period. Stress relaxation of inspection cover bolting is a mechanism which may be determined to be not UTLR when retorquing of the nuts periodically resets the stress relaxation magnitude during the course of the original license term.

If unsuccessful in demonstrating that an ARDM is not plausible or not unique for a particular subgroup, the evaluator may choose to demonstrate that it is in fact plausible because evidence of its occurrence exists either on site or elsewhere in the industry. This step may precede the above evaluations to determine non plausibility and non uniqueness if it is known that the ARDM has actually occurred.

Either the rationale for designating an ARDM/subgroup combination as non plausible or not unique or the evidence that the mechanism is in fact plausible is recorded in the intersection block of the matrix. Numbers are used to designate justifications for non-plausibility and non uniqueness determinations and letters for plausibility explanations. Numbers and letters refer to corresponding numbers and letters in the matrix code listing where the actual justifications and explanations are presented. All plausibility discussions will also include attributes of an effective program for managing the ARDMs.

In many matrices, there are ARDM/subgroup combinations where the evaluator cannot show that the ARDM is not plausible or is not unique but there is no evidence that this mechanism has ever manifested itself for the type of subcomponent making up the subgroup. In this case, the ARDM-subgroup combination must be considered to be plausible. However, the evaluator may recommend actions other than an effective program to manage the aging of such subcomponents. Further analysis, data gathering, one-time inspections, industry destructive testing initiatives or other activities may be conducted to provide the needed evidence that this ARDM is in fact not plausible or not unique for the subgroup. In such cases the ARDM is designated as plausible but

the matrix code explanation may contain recommendations for further analysis or one time inspections rather than attributes of an effective aging management program. When recommendations for such activities are determined to be the preferred approach in the Implementations Task, a schedule for these activities will be included within the evaluation results.

4.4 Program Effectiveness Evaluation.

For each completed component-ARDM combination evaluation, the effectiveness of existing programs to manage the plausible component-ARDM combinations is evaluated.

Paragraph 54.21(a)(6) of the License Renewal Rule specifies the following criteria for an effective program.

Effective programs must:

(i) Ensure identification and mitigation of age -related degradation unique to license renewal for the SCs identified pursuant to paragraph (a)(3) of this section; and

(ii) Contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met;, and

(iii) Be implemented by facility operating procedures and reviewed by the onsite review committee.

The first step of performing an effectiveness evaluation is to characterize the maintenance activities (PAs or Tasks) associated with the components. The programs listed in Table 3-1 are reviewed to determine which programs are applicable to each group of components. Then these programs are related to the general attributes of an effective maintenance strategy as describe below:

An effective maintenance strategy consists of the following elements:

(1) Discovery - The method of discovering performance or condition degradation is identified. The performance or condition degradation must have the characteristic that it will reveal itself or can be identified through the specified technique.

(2) Assessment/Analysis - Once performance or condition degradation is revealed, it must be compared to criteria or standards to determine the degree of the degradation. This could consist of operator judgement, documented engineering calculations or a variety of other means. Many times Discovery and Assessment/Analysis are contained in the same procedure.

(3) Corrective Action - When the degree of degradation is known, a specific corrective action can be determined. Generally, a corrective action will be defined in a separate procedure rather than in the Discovery or Analysis procedure. If the corrective action is simple like "replace the light bulb," then corrective action may not have procedural steps.

(4) Confirmation/Documentation - After the corrective action is performed, post maintenance testing confirms that maintenance was performed correctly and the equipment performs its intended function. The corrective action is documented for future reference.

Once the PAs or tasks associated with the component group are characterized into a maintenance strategy, the three effective program criteria are applied by translating them into a series of questions to be asked about the PAs or Tasks. These questions are based on the keywords in the three criteria.

The keywords in the first criteria are "identification" and "mitigation":

(i) Ensure identification and mitigation of age-related

degradation unique to license renewal for the SCs identified pursuant to paragraph (a)(3) of this section;

The keywords "identification" and "mitigation" are translated into the questions:

Is the Discovery PA or Task frequency interval less than the shortest known failure time?

Does the PA or Task demonstrate historically that it is effective in mitigating aging degradation of components (i.e. has the aging mechanism caused an ITLR functional failure?

Does the PA or Task identify and mitigate all relevant age management issues?

The keywords in the second criteria are "acceptance criteria" and "timely corrective action":

(ii) Contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.

The keywords "acceptance criteria" and "timely corrective action" are translated into the questions:

Does the PA or Task have an action or alert value or condition parameter to determine the need for corrective action?

Does the action value or condition provide sufficient indication of degradation to ensure that there will not be an ITLR System functional failure prior to the next PA or

Task?

Does the PA or Task ensure that appropriate corrective action is taken?

Does the corrective action documented in the PA or Task receive proper work prioritization; i.e. scheduled and completed on schedule, or positive alternative action identified?

Does the PA or Task have a confirmation process that ensures corrective action is taken?

The keywords in the third criteria are "implemented" and "reviewed":

(iii) Be implemented by facility operating procedures and reviewed by the onsite review committee.

The keywords "implemented" and "reviewed" are translated into the question:

Does the PA or Task have a process for review, revision and approval?

All of the above questions are answered by referring to the maintenance strategy, operational experience, maintenance history, and testing results. All questions must to answered in a positive manner for the maintenance strategy to be considered effective. Any question with a "no" answer must have a program modification or age management alternative identified that will enable the strategy to be effective. Those program modifications and age management alternatives become recommendations for implementation in the next step of the IPA process.

Examples of the options for modifying an existing program include

but are not limited to the following:

- Adding steps to inspection procedure for specific ARDM symptoms.
- Changing task frequency.
- Adding specific ARDM mitigation procedures.
- Increasing record keeping requirements.

If no existing plant program can be modified to address the component-ARDM, programs implemented at other utilities are investigated to determine if they can be adapted for Calvert Cliffs.

If such an industry program cannot be adapted, then development of a new program would be necessary. The activities that would effectively monitor, mitigate, or prevent loss of component ITLR functions for each plausible component-ARDM combination would be identified by referring to a list of acceptable industry practices maintained in the LCM Unit at BG&E as a basis for identifying these management alternatives. The guidelines for new program development include reviewing preventive techniques, verification techniques, component replacement and component remaining life assessments.

Once an alternative has been selected for implementation, the new program will be prepared in accordance with BG&E procedures, implemented, and then again evaluated for effectiveness in managing the component-ARDM. All credited Life Cycle Management Practices (LCMPs) shall be specifically identified as LCMPs ("tagged"), thus ensuring LCM review should changes to these programs be needed.

The possible outputs of the Program Evaluation will consist of the following:

1. Life Cycle Management Practices (LCMPs) that effectively

manage plausible component-ARDM combinations. In this case, the component-ARDM combinations are fully resolved. The LCMP is tagged to ensure further changes to the program do not compromise continued effectiveness.

2. Recommended methods to address those component-ARDM combinations that are not effectively addressed by existing programs, In this case recommendations are input into the Implementation step of the IPA to either modify an existing program to fully address the ARDM for the component, adapt a program implemented elsewhere in the industry or define a new program at CCNPP.

5.0 IMPLEMENTATION PLANNING OVERVIEW

As a result of the Component Evaluation and Component Aging Evaluation, recommendations are produced to modify or establish adequate or effective programs. Adequate programs manage performance and effective programs manage aging of systems, structures, and components

Paragraph 54.21(d) of the License Renewal Rule specifies the following documentation requirements for effective programs:

A description must be provided of any proposed modifications to the facility or its administrative control procedures necessary to ensure that age-related degradation unique to license renewal is adequately managed during the renewal term.

Whether they apply to adequate programs or effective programs, all recommendations will be successfully implemented through the following steps:

1. Classify the Recommendation
2. Specify milestones/schedule
3. Initiate tracking of the recommendations
4. Negotiate recommendations, milestones, schedule
5. Initiate recommendations through site processes
6. Track and report

Classifying the recommendation consists of categorizing the implementation plan for the recommendation as a short, medium, or long term activity. The classification is made according to several factors such as the basis for the recommendation (i.e., a deficiency, plant safety or performance improvement, etc.), the level of effort required to implement the recommended action, the time frame for initiation of the action, the resources available to implement the action, and the economic aspects of implementing the action.

The following criteria are used as guidance in classifying the recommendations into one of three categories - short, medium, and long term.

(1) **Short term** - up to 1 year and defined by either of the following:

- Immediate action is required to resolve an identified deficiency related to personnel or nuclear safety. Actions in this category shall be documented in the plant corrective action program.

  Examples:
  - Significant component degradation identified or expected in the near future.
  - Component failures have occurred in industry based on published reports and this information is applicable to CCNPP.

- Minimum investment in resources is required to implement the recommendation and significant near term benefit to plant safety or performance can be realized. These actions shall be implemented by the appropriate plant procedure.

  Examples:
  - Minor procedure revisions for which the appropriate changes are specific and clear.
  - Operational practice changes that do not involve a significant increase in resources.
  - System or component modifications of small scope.

(2) **Medium term** - up to the end of the current plant operating license term and defined by any of the following:

- Implementation of the action(s) supports the eventual

implementation of long term actions.

Examples:

- Component performance trending enhancements.
- Modifications to ISI-type inspection programs.
- Trending program enhancements.
- Information tracking programs (such as Fatigue Monitoring).

⌂ Actions that will result in near term benefits to plant safety or performance.

Examples:

- Personnel safety enhancements.
- Nuclear safety enhancements.
- Plant output or efficiency enhancements.

⌂ Actions that require medium to large investments of resources.

Examples:

- Development of new programs.
- Major revisions to existing programs.
- System or component design changes.

(3) **Long term** - during the renewed license term.

⌂ Actions that are required to be implemented primarily as a basis for renewal of the plant's operating license and are only benefits during the license renewal term.

⌂ Actions which may not need to be implemented at all pending further evaluation.

Classification also consists of identifying the basis for the recommendation, whether it includes a hardware or programmatic

change or both, what the effected documents and equipment are, and who the keys contacts for the system and programs are. As appropriate, action plans are developed and updated.

Attachment A

Component Evaluation Procedure LCM-10
Rev 2, Change 0

INFORMATION ONLY

CALVERT CLIFFS NUCLEAR POWER PLANT

UNITS 1 AND 2

PROCEDURE LCM-10

LCM COMPONENT EVALUATION

REVISION 2

Action	Signature	Name-Printed	Date
Prepared By	J R Schott	J. R. Schott	02-02-93
Technical Reviewer	B M Tilden	B. M. Tilden	3/1/93
Functional Reviewer	D J DiBello	D. J. DiBello	3/1/93
Supervisory Approval	B W Doroshuk	B. W. Doroshuk	3/2/93
QA Approval (If Applicable)	N/A	N/A	
POSRC Review	Mtg No: 93-018	N/A	
Plant General Manager Approval	N/A	Delayed Implementation Approved YES NO (N/A)	
Effective Date	Pre-Implementation Requirements Completed: YES (N/A)	Release for Distribution Signature: B M Tilden	3/2/93

EXECUTIVE SUMMARY SHEET

Revision	Change Number	Summary of Change
0	0	Initial Issue
1	0	a. Incorporated TPRs 92-031, 92-039, 92-034, 92-033, 92-032, 92-036, 92-072 and 92-023. b. Deleted Section 6.2 Subdivide the Component Into Standardized Equipment Types (SETs). This section had not proved useful since all components were already in SETs as a result of the screening task. c. Added specific reference to LCM-16, the Program Evaluation Procedure at appropriate places in the procedure. d. Added paragraphs to explain which steps of this procedure implement specific sections of the license renewal rule. e. Updated references.
2	0	a. The LCM Component Evaluation now dispositions components and device types as either short-lived (replacement program) or long-lived (matrix) categories. The programs identified to address the short-lived components will be evaluated for their adequacy in providing reasonable assurance that the component will not be subject to aging degradation unique to license renewal. The specific changes to the LCM-10 procedure are: 1. Development of ARDM matrices have been removed and incorporated in LCM-16. 2. The Program Adequacy Evaluation has been incorporated from LCM-16. 3. The philosophy behind component disposition has been revised to reflect the modified LCM process. b. Incorporated TPRs 91-202, 92-059, 92-073, 92-099, 92-100, 92-119, 92-122, 92-123, and 92-154.

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1.0 PURPOSE

The Component Evaluation Procedure governs both the Component Disposition Task and the Program Adequacy Evaluation of the Baltimore Gas & Electric Integrated Plant Assessment for Aging Process.

The Component Disposition Task objective is to identify short-lived components. Short-lived components are those that are subject to regular inspection or testing and are replaced or refurbished, either based on a calendar frequency or when a key monitored parameter exceeds a threshold value. Short-lived components are not subject to aging unique to license renewal because they will be replaced or restored to a specified condition several times during the original license period. Therefore, they will not experience aging which is any different in character or magnitude during the license renewal period. Short-lived components, because they are not subject to aging unique to license renewal, do not require an effective aging management program per 10 CFR 54.21(a)(3). Such components will be governed by the Maintenance Rule (10 CFR 50.65) to ensure that they can continue to perform their important functions.

If a component is not short-lived it is said to be long-lived A long-lived component is typically designed to last the life of the plant. For such components, maintenance strategies involve inspection and monitoring of key parameters to ensure that initial design was adequate. Long-lived components may be subject to aging unique to license renewal as defined in 10 CFR 54.3 and therefore may require effective aging management programs for the license renewal term.

The Program Adequacy Evaluation objective is to determine whether the existing CCNPP Program(s) adequately ensure that component replacement or refurbishment will occur before the component is subject to aging unique to license renewal. Adequate programs provide reasonable assurance that components are replaced or refurbished and are not subject to aging degradation unique to license renewal.

2.0 SCOPE

This LCM Procedure governs the ITLR Component Evaluation Process used for all ITLR systems at Calvert Cliffs Nuclear Power Plant Units 1 and 2. Specific instructions are provided for reviewing and referencing Source Documents, and for documenting each step of the process.

Work products generated by this procedure are reviewed and approved in accordance with established QA Review and Approval processes. The ITLR Component Evaluation Process is a safety related task. An independent technical review is required to verify results.

Important to Power Production (ITPP) components are not within the scope of this procedure.

A separate procedure will discuss the detailed aging evaluation process and the guidelines for evaluating the effectiveness of programs to manage their aging.

3.0 REFERENCES

3.1 Developmental References

A. Baltimore Gas and Electric Life Cycle Management/License Renewal Program Management Plan, Baltimore Gas and Electric Co., Revision 2.0, dated April 30, 1992

B. BG&E Quality Assurance Manual - Revision 10, dated March 25, 1991

C. Life Cycle Management Program - Methodology for Integrated Plant Assessment Volume 1: Screening Methodology, dated April 7, 1992

D. Life Cycle Management Program - Methodology for Integrated Plant Assessment Volume 2: Evaluation Methodology, draft dated November 6, 1992

E. LCM Component ITLR Screening of Systems Procedure, Procedure No. LCM-12, Revision 2, dated April 13, 1992

F. Nuclear Power Plant License Renewal Rule, 10 CFR Part 54, dated January 13, 1992

G. Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses, Draft NRC Regulatory Guide DG-1009, dated December 1990

H. Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants, Draft NUREG-1299, dated November 1990

3.2 **Performance References**

A. LCM Program Instruction: Technical Problems Reporting

B. Calvert Cliffs Nuclear Power Plant, Quality List Manual

C. Calvert Cliffs Updated Final Safety Analysis Report (UFSAR)

D. System and Structure ITLR Screening Results

E. Component Level ITLR Screening Results

F. Calvert Cliffs Nuclear Power Plant Preventive Maintenance Cards

G. Calvert Cliffs Nuclear Power Plant Surveillance Test Procedures

H. Calvert Cliffs Nuclear Power Plant In Service Inspection Procedures

I. Calvert Cliffs Nuclear Power Plant Equipment Qualification Design Manual

J. Calvert Cliffs Nuclear Power Plant Technical Specifications

K. Calvert Cliffs Nuclear Power Plant Operating Procedures

L. Calvert Cliffs Nuclear Power Plant Operating Instructions

M. Calvert Cliffs Nuclear Power Plant Drawings

N. Calvert Cliffs Nuclear Power Plant Design Basis Document (if available)

O. Calvert Cliffs Nuclear Power Plant NUCLEIS Equipment Technical Database

P. Calvert Cliffs Nuclear Power Plant Nuclear Optical Records Management System (NORMS)

Q. Component Evaluation Results from previously completed systems

R. Component Aging Evaluation Results from previously completed systems

S. Control of Master Equipment List, DDBUP-1

4.0 PREREQUISITES

4.1 System and Structure ITLR Screening Results

In System Screening, all systems are evaluated to determine which are Important to License Renewal and to identify the functional requirements of these ITLR systems. System Screening will be completed and the results that relate to the system being evaluated shall be available prior to the start of this procedure. The information from System Screening that is relevant to this procedure includes:

- System Name and Number
- System Description
- System Functional Requirements
- System Bases for ITLR Determination
- Listing of Source Documents

4.2 Component Level ITLR Screening Results

In Component Screening, all system components are evaluated to determine whether they are ITLR. Component Screening of the system will be completed and the complete results available prior to the start of this procedure. A database listing Equipment IDs and Equipment Descriptions for system components which are Important to License Renewal will be provided to support the evaluation process. Additionally, for those components identified as being ITLR, the specific information from the Component Screening task that is related to the ITLR components will be available as input. This information includes:

- ITLR System Functions and Numbers
- Equipment ID Number
- Component Description
- Component ITLR Designation
- System Function Numbers for Each Component
- Identification of Source Documents Used

4.3 System Integrated Plant Assessment Packages

Completed System Integrated Plant Assessment (IPA) packages will be available as input prior to the start of this procedure. The specific information that is found in the completed System IPA packages includes:

- Component Screening Results, including:

  1. Table 1, ITLR System Functions
  2. Table 2, Component Level ITLR Screening Results

- Component Evaluation Results, including:

  1. Device Type Disposition Records (Attachment 1)
  2. Development of Potential Program Sheet (Attachment 2)
  3. Component Grouping Summary Sheets (Attachment 3)
  4. Sub-Component/Sub-Group Identification Sheets (Attachment 4)

5. Existing Program Adequacy Evaluations (Attachment 11)

- Component Aging Evaluation Results, including:

1. Potential ARDM Lists (Attachment 7)
2. ARDM Matrices (Attachment 5)
3. Matrix Code Lists (Attachment 6)
4. Effective Program Evaluations (Attachment 9)

4.4 Plant Configuration Control Documents

Additional plant information on the ITLR components will be available as input prior to the start of this procedure. The specific information that is found in the Plant Configuration Control Documents includes:

- Facility Change Requests (FCRs) or other documents that can confirm a component is to be replaced.

- Vendor technical manuals and drawings, plant drawings, and other reference material.

- Information from the site NUCLEIS/NORMS database in hard copy printout:

1. Bill of Material Printout
2. Reference Material Printout
3. Critical Design Characteristics Printout
4. List of Programs Printout

- Copies of applicable component programs, including:

1. Preventive Maintenance (PM)
2. Surveillance Test Procedures (STPs)
3. Inservice Inspection (ISI)
4. Equipment Qualification (EQ)

4.5 Evaluator Qualifications

All evaluators will be qualified to the extent necessary to perform their specific tasks. This qualification should include general indoctrination training on the LCM Program and specific training on the Component Evaluation Process.

5.0 PRECAUTIONS

All source material used in conjunction with this procedure will consist of documents approved by the LCM Program Staff or obtained directly from the CCNPP Document Control Room.

Task results obtained through the performance of this procedure will be referenced to the most recent version of the reference material available at the time that the task is begun. The specific revision status of all reference material will be recorded whenever the procedure calls for recording of a reference.

Task results, including Device Type Disposition Records, Component Grouping Summary Sheets,

Sub-Component/Sub-Group Identification Sheets, Development of Potential Program Sheets, Existing Program Adequacy Evaluations, Annotated Bill of Materials Computer Printout, Potential ARDM Lists, ARDM Matrices, and Matrix Code Lists will become LCM controlled documents.

This procedure, along with all products produced by the application of this procedure, are the property of BG&E. They shall not be distributed or used without the expressed written permission of BG&E.

6.0 PROCEDURE

6.1 Determine If Component is Scheduled for Replacement

The evaluator will review plant configuration control documents to determine whether a system component is scheduled for replacement so that the replacement component may be evaluated.

NOTE:

The scope of work to be reviewed in this step includes those tasks which are budgeted and scheduled for the next outage in each unit as well as those replacements which have already been implemented but the NUCLEIS information has not yet been updated. The evaluator should review applicable closed documentation back to the date of the previous outage for each unit to ensure that equipment changes are accurately reflected in the Bill of Material printout. The evaluator should also utilize CCETS pending change status and NUCLEIS equipment status fields to determine in-process changes for components due to change documents.

A. **REVIEW** the following and **IDENTIFY** any scheduled and planned plant changes that will replace ITLR components in the system:

1. Facility Change Requests (FCRs).
2. Minor Change Requests (MCRs).
3. Other change documents such as FEC and FCR supplements.

B. **IF** a component is scheduled to be replaced with a new component **AND IF** the replacement is not a "like-for-like replacement[1]", **THEN PERFORM** the following:

1. **IF** the evaluation package does NOT contain specific information about the new replacement component, **THEN RECORD** the following on Attachment 1:

   a. The device type name in the Device Type column.
   b. The applicable Equipment IDs in the Equipment ID column.

---

1 A like-for-like replacement exists when there are no differences between the original and replacement component. No difference means that all technical criteria, configuration, item or component qualification (e.g. seismic or environmental) are the same or more restrictive.

c. "On Hold for Replacement" in the Method Column.
d. The document number which governs the replacement in the Document ID Column.

2. **IF** the evaluation package contains specific information about the replacement component, **THEN**:

   a. **MAKE** a pen and ink change to the Bill of Material Printout and Critical Design Characteristics Printout to record data pertinent to the replacement component.

   b. **ANNOTATE** the pen and ink change with a change bar in the right margin and **NOTE** the document number governing the replacement.

   c. **COMPLETE** the Component Evaluation using the data for the replacement component and **INCLUDE** the annotated printouts with the component evaluation.

6.2 Determine If Identical Device Types Have Been Previously Evaluated

Components of the system being evaluated which belong in a device type which has been previously evaluated in another system Integrated Plant Assessment will be dispositioned (e.g. - Replacement Program or Matrix) in the same manner as the previously evaluated components.

NOTE:

In the context of this procedure, the following term shall convey the meaning indicated:

Previous Component Evaluation Results - The component evaluation results from previous systems which have completed an Integrated Plant Assessment. These previous component evaluation results will be used to determine the disposition of the components being evaluated by this system Integrated Plant Assessment.

NOTE:

Device type code and equipment type are identified in DDBUP-1 (reference 3.2.S). These designations should be used for data entry where "device type" is specified.

A. **REVIEW** the Component Level ITLR Screening Results, Table 2, and **SELECT** a device type for evaluation. **IF** all device types have been evaluated, **THEN PROCEED** to Step 6.3.

B. **REFER** to previous component evaluation results and **DETERMINE** if the same device type was evaluated.

C. **IF** the device type has NOT been previously evaluated, **THEN PROCEED** to Step 6.2.E.

D. **DETERMINE** how the components of the same device type were dispositioned in the previous component evaluation results.

1. **IF**, in the previous component evaluation results, all the components of this device type were determined to be addressed by a replacement/refurbishment program **THEN, FOR** all components in the device type:

   a. **REFER** to programs related to the current system on the List of Programs printout from NORMS or other programs known to be applicable to the system.

NOTE:

The evaluator should initially check the title of the program to determine if a similarly entitled program exists (e.g. - a program entitled "Leak Test of Check Valves", which applies to a previous system could correspond to one entitled "Leak Test of Check Valves" in the current system). In some instances the similarity will not be obvious from the titles. In these cases, the evaluator will have to refer to other information to locate corresponding programs.

   b. **ATTEMPT** to locate a program or programs which correspond to the programs credited as replacement/refurbishment programs in previous component evaluation results.

   c. **IF** programs are located which apply to specific components in the system being evaluated and are similar to those credited as replacement/refurbishment programs in previous component evaluation results, **THEN**, **FOR** each program identified, **RECORD** the following on Attachment 1:

      (1) The device type code in the Device Type column.
      (2) Applicable Equipment IDs in the Equipment ID column.
      (3) "Replacement Program" in the Method Column.
      (4) The Program ID(s) of the program for the system being evaluated in the Document ID column.

   d. **IF** programs cannot be located for specific components in the system being evaluated, **THEN RECORD** the following on Attachment 1:

      (1) The device type code in the Device Type column.
      (2) Applicable Equipment IDs in the Equipment ID column.
      (3) "Replacement Program Potential" in the Method Column.

      (4) The program ID(s) of representative program(s) in previous component evaluation results and the associated system number in parentheses (e.g. - MPM01013 (012)) in the Document ID column.

   e. **RETURN** to Step 6.2.A.

2. **IF**, in the previous component evaluation results, all the components of this device type were evaluated with an ARDM matrix **THEN, FOR** all components in the device type:

   a. **COMPARE** the Grouping Attributes in the previous component evaluation results for this device type with the attributes found on the Bill of Material and Critical Design

Characteristics printouts for the system components currently being evaluated.

(1) **IF** the current component printouts are missing information which corresponds to the grouping attributes of the previous component evaluation results, **THEN REFER** to technical manuals, plant drawings or other reference material as necessary to locate the needed information for the current component.

(2) **ANNOTATE** this information on the Bill of Materials and Critical Design Characteristics printouts as appropriate.

NOTE:

In some cases, the environmental service conditions may not be designated as a grouping attribute because all components in the previous system operated in a common environment. The evaluator must consider the environmental service conditions of the previous system and the current system when determining whether grouping attributes are "identical."

b. **IF** components in the system being evaluated have identical grouping attributes as the grouping attributes in the previous component evaluation results, **AND** the environment in the previous system is identical to that in the system being evaluated, **THEN FOR** each identical group in the current system:

(1) **RECORD** the following on Attachment 1:

(a) The device type code in the Device Type column.
(b) The new Group ID in the Group ID Column (using the following format for Group ID: System Number followed by the Device Code followed by a Sequential Number).
(c) All Equipment IDs in the device type with the identical grouping attributes in the Equipment ID column.
(d) "Matrix Identical" in the Method Column.
(e) The Group ID(s) of the group(s) from the previous component evaluation results which contain identical grouping attributes in the Document ID column.

(2) **RECORD** the following on Attachment 3:

(a) The new Group ID and in parentheses the Group ID(s) of the group(s) from the previous component evaluation results.
(b) The grouping attributes copied from the Component Grouping Summary Sheet of the previous component evaluation results.
(c) Applicable equipment IDs.

(3) **COPY** the Sub-Component/Sub-Group Identification Sheets (Attachment 4) (if applicable), ARDM Matrix (Attachment 5) and Matrix Code List (Attachment 6) for the previous evaluation results **AND INCLUDE** these with the results of this evaluation.

(4) **RETURN** to Step 6.2.A.

c. **IF** components in the system being evaluated are identified with grouping attributes which do not exactly match the grouping attributes of the previous component evaluation results, **THEN RECORD** the following on Attachment 1:

(1) The device type code in the Device Type column.
(2) The new Group ID in the Group ID Column (using the following format for Group ID: System Number followed by the Device Code followed by a Sequential Number).
(3) All Equipment IDs in the device type which do not exactly match grouping attributes in the Equipment ID column.
(4) "Matrix Different" in the Method Column.
(5) The Group ID(s) of the group(s) from the previous component evaluation results which contain the most similar grouping attributes in the Document ID column.

d. **RETURN** to Step 6.2.A.

3. **IF**, in the previous component evaluation results, some of the components of this device type were determined to be managed by replacement/refurbishment programs and the others were evaluated with an ARDM matrix, **THEN DETERMINE** what characteristics of the individual components caused the previous component evaluation results to be evaluated with two different strategies.

a. **USE** the same or similar characteristics to divide the device type of the current system into replacement/refurbishment program or ARDM matrix components.

b. **FOR** the replacement/refurbishment program components, **PERFORM** Steps 6.2.D.1.a through 6.2.D.1.d, **REVISE** the entry in the Device Type column to add "(short-lived)" after the device type code.

c. **FOR** the ARDM matrix components, **PERFORM** Steps 6.2.D.2.a through 6.2.D.2.d, **REVISE** the entry in the Device Type column to add "(long-lived)" after the device type code.

d. **ADD** a footnote to Attachment 1 to explain the criteria used to determine how the components were dispositioned.

e. **RETURN** to Step 6.2.A.

E. **REFER** to previous component evaluation results and **DETERMINE** if components of the same equipment type were evaluated.

F. **IF** no components of the equipment type have been previously evaluated, **THEN RETURN** to Step 6.2.A.

G. **DETERMINE** how the components of the same equipment type were dispositioned in the previous component evaluation results.

1. **IF**, in the previous component evaluation results, all the components of this equipment type were determined to be addressed by a replacement/refurbishment program, **THEN**, **FOR** all components in the device type:

a. **REFER** to programs related to the current system on the List of Programs printout from NORMS or to other programs known to be applicable to the system.

> NOTE:
>
> The evaluator should initially check the title of the program to determine if a similarly entitled program exists (e.g. - a program entitled "Leak Test of Check Valves", which applies to a previous system could correspond to one entitled "Leak Test of Check Valves" in the current system). In some instances the similarity will not be obvious from the titles. In these cases, the evaluator will have to refer to other information to locate corresponding programs.

b. **ATTEMPT** to locate a program or programs which correspond to the programs credited as replacement/refurbishment programs in previous component evaluation results.

c. **IF** programs are located which apply to the current system and correspond to those credited as replacement/refurbishment programs in previous component evaluation results, **THEN**, **FOR** each program identified, **RECORD** the following on Attachment 1:

   (1) The device type name in the Device Type column.
   (2) Equipment IDs in the Equipment ID column.
   (3) "Replacement Program" in the Method Column.
   (4) The Program ID of the corresponding program for the current system in the Document ID column.

d. **IF** programs cannot be located for specific components in the system being evaluated, **THEN RECORD** the following on Attachment 1:

   (1) The device type name in the Device Type column.
   (2) Equipment IDs in the Equipment ID column.
   (3) "Replacement Program Potential" in the Method Column.
   (4) The program IDs of representative programs in previous component evaluation results and the associated system number in parentheses in the Document ID column.

e. **RETURN** to Step 6.2.A.

2. **IF**, in the previous component evaluation results, all the components of this equipment type were evaluated with an aging matrix, **THEN RECORD** the following on Attachment 1 for the component(s):

   a. The device type name in the Device Type column.
   b. The new Group ID in the Group ID Column (using the following format for Group ID: System Number followed by the Device Code followed by a Sequential Number).
   c. All Equipment IDs in the device type which do not exactly match grouping attributes in the Equipment ID column.
   d. "Matrix Different" in the Method Column.
   e. The Group ID(s) of the previously evaluated group(s) which contain the most similar

grouping attributes in the Document ID column.

3. **RETURN** to Step 6.2.A.

NOTE:

If the evaluator determines that the device types of the equipment type being evaluated were dispositioned differently in previous evaluations, Step 6.3 is performed to determine the appropriate disposition for the given device types.

6.3 Disposition Device Types Not Previously Evaluated

This step is performed for those device types that are not similar enough to any previously evaluated device type to make a determination as to whether they should be dispositioned as short-lived or long-lived. The strategy used in this section is that components which are subject to regular inspection or testing and are replaced or refurbished based on predetermined criteria are short-lived and therefore are not subject to any aging degradation unique to the license renewal period.

The evaluator will review the Programs/Activities (PAs) that are or could be associated with the component of the device type being reviewed and identify PAs that could be an adequate replacement/refurbishment program.

NOTE:

In the context of this procedure, the following terms shall convey the meaning indicated:

Program/Activity (PA)- A group of procedures, formal or otherwise, that provide reasonable assurance that structures, systems, and components are capable of fulfilling their intended functions. This may range from a formalized, long established group of procedures to a one time only procedure. An example of this concept is the Preventive Maintenance (PM) Program.

Task- A specific division of a PA which can generally be performed independently of all other items within the PA. An example of a Task is a specific PM Card.

Subtask- A part of a task. An example of a subtask would be one or more steps of a particular PM Card.

A. **REVIEW** the Component Level ITLR Screening Results, Table 2, and the Device Type Disposition Record, Attachment 1, and **IDENTIFY** the components which have NOT been dispositioned.

B. **SELECT** a device type for evaluation. **IF** all device types have been evaluated, **THEN PROCEED** to Step 6.4.

C. **IDENTIFY** the applicable PAs that are or could be associated with the components within the device type selected.

D. **IF** no PAs are or could be associated with the components, **THEN PROCEED** to Step 6.3.J.

E. **OBTAIN** a copy of each applicable Task.

F. **REVIEW** all the applicable tasks and **IDENTIFY** a PA as a replacement/refurbishment program for some or all of the components if it meets either of the following criteria:

1. The component is routinely replaced or refurbished after a set time frame has expired.

2. The component is routinely replaced or refurbished when a monitored parameter reaches a specific limit.

G. **FOR** each component associated with a PA, **RECORD** the following data on Attachment 1:

1. The device type code in the Device Type column.
2. All Equipment IDs associated with a replacement/refurbishment program(s) in the Equipment ID column.
3. "Replacement Program" in the Method Column.
4. The applicable PA Task ID number(s) in the Document ID column.

H. **IF** some or all of the components could be, but are not currently included in a PA, **THEN RECORD** the following data on Attachment 1 for each covered component:

1. The device type code in the Device Type column.

2. All Equipment IDs which could be associated with the replacement/refurbishment program(s) in the Equipment IDs column.
3. "Replacement Program Potential" in the Method Column.
4. The applicable PA Task ID number in the Document ID column.

I. **RETURN** to Step 6.3.B.

J. **IF** some or all of the components are not subject to replacement/refurbishment programs, **THEN RECORD** the following on Attachment 1 for each component:

1. The device type code in the Device Type column.
2. All Equipment IDs which are not subject to replacement/refurbishment programs in the Equipment ID column.
3. "Matrix Develop" in the Method Column.
4. "None identified" in the Document ID Column.

K. **RETURN** to Step 6.3.B.

6.4 Develop Potential Replacement/Refurbishment Programs

This section will evaluate device types dispositioned as "Replacement Program Potential" to determine the attributes for an adequate replacement/refurbishment program. This will typically involve the development of a new PA/Task which will be modeled after an existing PA/Task.

Device types dispositioned by Section 6.2 will have PAs identified from previous system evaluations. These device types will require new PAs developed/modeled after the referenced PAs from previous system evaluations. Device types dispositioned by Section 6.3 will require

evaluation to determine whether a new PA is required to be developed, modeled after the referenced PA, or a modification to the referenced PA is required to include additional components.

A. **REVIEW** the Device Type Disposition Record, Attachment 1, and **IDENTIFY** all components dispositioned as "Replacement Program Potential" in the Method column.

B. **SELECT** a device type for evaluation. **IF** all device types have been evaluated, **THEN PROCEED** to Step 6.5.

C. **SELECT** all components with the same Document ID entry in the Document ID column of Attachment 1 which have an entry with a system number in parentheses. **IF** no components are identified, **THEN PROCEED** to Step 6.4.E.

D. **DEVELOP** the attributes of a potential replacement/refurbishment program modeled after the PA/Task identified in the Document ID column.

1. **OBTAIN** a copy of the PA/Task identified in the Document ID column.

2. **DOCUMENT** the recommended attributes by **RECORDING** the following data on Attachment 2:

(a) Potential program ID using the following format: System Number followed by "Potential" followed by a Sequential Number (e.g. - 012-Potential-01).

(b) Model program PA/Task ID from previous component evaluation results.
(c) Recommended subtask attributes as applicable:

(1) Subtask Number
(2) Description of Subtask
(3) Equipment IDs
(4) Data Parameter
(5) Alert Value
(6) Alert Bases (if available)
(7) Corrective Action

3. **RETURN** to Step 6.4.C.

E. **SELECT** a component with an entry in the Document ID column of Attachment 1 without a system number in parentheses. **IF** no components are identified, **THEN RETURN** to Step 6.4.B.

NOTE:

Modifications of existing PAs/Tasks to include additional components or additional subtasks must consider the compatibility of the existing subtasks and the recommended modification. For example, the inclusion of structural components and subtasks in an electrical PA/Task would not be compatible and would require the development of a new PA/Task.

F. **IF** an existing PA/Task can be modified, **THEN PERFORM** the following:

1. **OBTAIN** a copy of the PA/Task identified in the Document ID column.

2. **DOCUMENT** the recommended changes necessary to incorporate these modifications by **RECORDING** the following data on Attachment 12:

(a) System Number
(b) System Name
(c) PA/Task or Group ID
(d) Document/Subtask
(e) Present Description
(f) Recommendation

3. **RETURN** to step 6.4.E.

G. **IF** an existing PA/Task cannot be modified, **THEN** the evaluator should use engineering judgement to develop the attributes of a potential replacement/refurbishment program.

1. **DOCUMENT** the recommended attributes by **RECORDING** the following data on Attachment 2:

(a) Potential Program ID using the following format: System Number followed by Potential followed by a Sequential Number (e.g. - 012-Potential-01).

(b) Recommended subtask attributes as applicable:

(1) Subtask (ST) Number
(2) Description
(3) Equipment IDs
(4) Data Parameter
(5) Alert Value
(6) Alert Bases (if available)
(7) Corrective Action

2. **RETURN** to step 6.4.E.

6.5 Determine If Replacement/Refurbishment Programs are Adequate

In this step, the replacement/refurbishment programs for the device types dispositioned as "Replacement Program", "Replacement Program Potential", and "Replacement Program Sub-Component" are evaluated for adequacy in ensuring that they will result in component replacement or refurbishment before the components are subject to aging unique to license renewal.

The adequacy of individual programs is based on a set of established criteria which describe a process by which a PA or task will ensure that the components covered by the program are not subject to aging unique to license renewal through the following key program elements:

1) Discovery (i.e., operator rounds, testing, implementation of PA/Tasks)
2) Assessment/Analysis (i.e., alert values, root cause analysis)
3) Corrective Action (i.e., replacement/refurbishment procedures)

4) Confirmation/Documentation (i.e., post maintenance testing, trending, revision/changes).

The existing CCNPP PA or task(s) credited as replacement/refurbishment programs will be evaluated to determine if they provide sufficient information to implement the four elements described above. The adequacy of the program will be justified by reviewing operational experience/failures, inspection results, replacement/refurbishment intervals, and relevant design and manufacturer's information. Recommendations/documentation will be provided to modify existing plant programs so that they will be adequate to ensure the components covered by the program will not be subject to aging unique to license renewal.

NOTE:

An adequate program to provide reasonable assurance that a component will not be subject to aging unique to license renewal may comprise a collection of activities such as monitoring, servicing, repair, refurbishment, or replacement. Because a single task or a collection of PAs may apply to a given component, the evaluator should ensure that they consider the collection of PA(s) or task(s) as the basis for adequate program determination. This information will have been recorded on the Device Type Disposition Record, Attachment 1.

NOTE:

To complete this section of the program adequacy evaluation, the evaluator must consider the overall maintenance practices or programs at CCNPP. For example, the implementation of corrective action activities may not be referenced or identified in a specific preventive maintenance procedure for a given component. The corrective action/post maintenance testing is covered and procedurally initiated by the maintenance program at CCNPP. The evaluator should therefore consider and ensure that they address the overall program (referenced by PA(s) as well as normal practices) in determining the adequacy of CCNPP PA(s) or task(s).

NOTE:

The program adequacy evaluation process and documentation methodology for Replacement/ Refurbishment Programs are delineated in Attachments 11 and 12. If the PA(s) or task(s) were not adequate and require modification, the evaluator will document their findings and recommendations on Attachment 12.

A. **SELECT** a device type for evaluation by reviewing the Device Type Disposition Record, Attachment 1, and **IDENTIFYING** components dispositioned as "Replacement Program", "Replacement Program Potential", or "Replacement Program Sub-Component" in the Method column.

B. **IF** all device types have been evaluated, **THEN PROCEED** to Step 6.6.

C. **SELECT** the PAs or Tasks associated with the device type for the adequacy evaluation. **IF** all PAs and Tasks for this device type have been evaluated, **THEN RETURN** to Step 6.5.A.

NOTE:

The evaluation of PAs or Tasks should consider the Existing Program Adequacy Evaluations identified in Step 6.5.D. The evaluations of the PAs or tasks associated with this system should be consistent with previous evaluations. When completing Attachment 11 for the current system, the Evaluator should review the previously completed Attachment 11s for input to the current evaluation.

D. **REVIEW** the Existing Program Adequacy Evaluations, Attachment 11, from previous component evaluation results for identical device types. **IDENTIFY** previous evaluations for programs similar to the PAs/Tasks curently under evaluation.

E. **IF** the discovery PA or Task identified in Step 6.5.C specifies a frequency interval, **THEN PROCEED** to Step 6.5.G.

F. **IF** the discovery PA or Task identified in Step 6.5.C does not specify a frequency interval, **THEN PERFORM** the following:

1. **REVIEW** the PA(s)/Task(s), associated with the same or similar device types and **DETERMINE** if the PA(s) or task(s) can be modified to provide a frequency interval. **IF** the evaluator can not specify a frequency based on existing documentation **THEN** use vendor information and/or engineering judgement to specify an appropriate frequency. **IF** engineering judgement is used, **THEN DOCUMENT** the rationale in the third column of Attachment 12.

2. **IF** a frequency can be defined, **THEN DOCUMENT** the recommended changes necessary to incorporate the frequency interval by:

   a. **RECORDING** the following data on Attachment 12:

      (1) System Number
      (2) System Name
      (3) PA/Task or Group ID
      (4) Document/Subtask
      (5) Present Description
      (6) Recommendation

   b. **PROCEED** to Step 6.5.G.

3. **IF** based on the engineering judgement of the evaluator, the PA(s), Task(s), or ST(s) cannot be changed, **THEN COMPLETE** the following:

   a. **REVISE** the Method column on Attachment 1 to "Matrix Develop".

   b. **RETURN** to Step 6.5.C.

NOTE:

Completion of Attachment 11 for components dispositioned as "Replacement Program Potential" will be based on the potential program developed in Section 6.4 as documented on Attachment 2. Where applicable, the Attachment 11 previously completed for the PA/Task used as the model for the potential program should be used as input for historical information on program performance. Component-specific work order history should be factored into the evaluation.

G. **COMPLETE** Attachment 11.

H. **IF** the evaluator answered NO to any of the items on Attachment 11, **THEN PERFORM** the following for each item answered "NO":

1. **IF** the evaluator answered NO to Criterion 1: Items 1.1.1, 1.1.2, or 1.1.3, **THEN REVIEW** the PA(s) or Task(s) and **DETERMINE** if an ST can be added or modified to preserve ITLR system functions and ensure the historical failure does not reoccur prior to the inspection, replacement, or refurbishment activity.

2. **IF** the evaluator answered NO to Criterion 2: Items 2.1.1, 2.1.2, or 2.1.3, **THEN REVIEW** the PA(s) or Task(s) and **DETERMINE** if an ST can be added or modified to preserve ITLR system functions and ensure that failure does not occur prior to the inspection, replacement, or refurbishment activity.

3. **IF** the evaluator answered NO to Criterion 2: Items 2.2.1, 2.2.2, or Criterion 3: Items 3.1.1, 3.1.2, or 3.1.3, **THEN REVIEW** the PA(s) or Task(s) and **DETERMINE** if an ST can be added or modified to provide the necessary work prioritization and program administrative control and ensure that corrective actions are taken and the program cannot be modified without the appropriate reviews and approvals.

4. **IF** changes can be made, **THEN DOCUMENT** the required/recommended changes and/or corrective actions necessary to ensure that failure does not occur prior to the inspection, replacement, or refurbishment activity by **RECORDING** the following data on Attachment 12:

   a. System Number
   b. System Name
   c. PA Task or Group ID
   d. Document/Subtask
   e. Present Description (if applicable)
   f. New/Revised Corrective Action/Recommendation

5. **IF** based on the engineering judgement of the evaluator a PA or task ST cannot be changed **THEN REVISE** the Method column on Attachment 1 to read "Matrix Develop."

I. **IF** the PA or task required modification to ensure its adequacy, **THEN REVISE** the Method column of Attachment 1 to "Replacement Program-Modification."

J. **RETURN** to Step 6.5.C.

6.6 Perform Independent Technical Review

An Independent Technical Review of the results completed in the previous steps must be conducted in accordance with the steps of Attachment 13.

7.0 POST-PERFORMANCE ACTIVITIES

7.1 Assemble and Deliver Work Products

The purpose of this section is to assemble the work products into packages for review and signature. The Evaluator or Task Manager performs each step in Section 7.0.

A. **PREPARE** a cover letter to transmit the work products.

B. **ASSEMBLE** all work products and the Independent Technical Review Record(s) into a package.

C. **TRANSMIT** the package and cover letter to the LCM Evaluations Engineer for review and approval.

7.2 Enter Results Into LCM DATA Software System

The purpose of this section is to initiate the transaction between the technical evaluation task and the information processing task of storing the evaluation results in an easily retrievable format. The System Task Leader shall perform the following steps:

A. **PREPARE** the Summary Matrix Database as follows:

1. **USE** the database listing Equipment IDs and Equipment Descriptions for system components which are Important to License Renewal provided in the Component Level ITLR Screening Results package.

2. **ADD** a data field to the database to identify components potentially subject to aging unique to license renewal.

3. **ENTER** "YES" in the new data field for each Equipment ID with "Matrix Identical", "Matrix Different", or "Matrix Develop" in the Method column of Attachment 1.

B. **PROVIDE** the Summary Matrix Database to the LCM Information Systems Engineer.

C. **ASSEMBLE** and **PROVIDE** the Source Document List (Attachment 10) containing reference material used as input for the component evaluation.

8.0 BASES

There are no specific Bases for this procedure other than those listed in the Developmental References Section.

9.0 RECORDS

Records generated by this Procedure shall be captured and controlled. Prior to transferring records to Plant History for retention, legibility and completeness of the records shall be verified

by the transmitting organization.

All products of this Procedure will be delivered to the LCM Program Administrator for serialization.

All products of this Procedure are permanent QA records which must be retained for the entire license renewal term.

10.0 ATTACHMENTS

NOTE:

All attachment forms shall serve as sample formats only. Changes in format are allowed in the execution of the procedure as long as the information content of the form remains constant. The LCM procedure which provides input to the attachment is referenced in parentheses.

Attachment 1	Device Type Disposition Record (LCM-10,16)
Attachment 2	Development of Potential Program (LCM-10)
Attachment 3	Component Grouping Summary Sheet (LCM-10,16)
Attachment 4	Sub-Component/Sub-Group Identification (LCM-10,16)
Attachment 5	ARDM Matrix (LCM-10,16)
Attachment 6	Matrix Code List (LCM-10,16)
Attachment 7	Potential ARDM List (LCM-10,16)
Attachment 8	Development Of Attributes For An Effective Program (LCM-16)
Attachment 9	Effective Program Evaluation (LCM-16)
Attachment 10	Source Document List (LCM-10,16)
Attachment 11	Existing Program Adequacy (LCM-10)
Attachment 12	Program/Activity (PA) Modifications (LCM-10,16)
Attachment 13	Independent Technical Review Procedure (LCM-10,16)
Attachment 14	Independent Technical Review Record (LCM-10,16)
Attachment 15	Independent Technical Review Record Continuation Sheet (LCM-10,16)

Attachment 1

Device Type Disposition Record

SYSTEM NUMBER: _____ SYSTEM NAME: _____ REPORT DATE: _____

Device Type	Equipment ID	Group ID	Method	Document ID

Attachment 2

Development of Potential Program

Potential Program ID: _____

Model Program PA/Task ID: _____

SUBTASKS (ST)

ST#	Description	Equipment ID	Data Parameter	Alert Value	Alert Bases	Corrective Action

Attachment 3

Component Grouping Summary Sheet

GROUP ID NUMBER: _____

GROUP ATTRIBUTES:

1. Device Type: _____
2. Vendor: _____
3. Model Number: _____
4. Material: _____
5. Internal Environment: _____
6. External Environment: _____
7. Function: _____
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

Attachment 4

Sub-Component/Sub-Group Identification

SYSTEM NUMBER: _____ SYSTEM NAME: _____

EQUIPMENT ID: _____ GROUP ID: _____

Sub-Component/ Sub-Group ID	Manufacturer	Model/ Serial Number	Material	Source Document	ITLR Function(s)	Function Reference(s)
A.						
B.						
C.						
D.						
E.						
F.						

Attachment 5

ARDM Matrix

SYSTEM NUMBER: _____ SYSTEM NAME: _____

EQUIPMENT TYPE: _____ DEVICE TYPE: _____

	GROUP OR SUB GROUP ID				
ARDMs					

Attachment 6

Matrix Code List

SYSTEM NUMBER:_____ SYSTEM NAME:_____

CODE	DESCRIPTION	SOURCE

Attachment 7

Potential ARDM List

DEVICE TYPE: _____

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE

Development of Attributes for an Effective Program

SYSTEM NUMBER: _____ SYSTEM NAME: _____

COMPONENT ID: _____ GROUP ID: _____

1 PLAUSIBLE ARDM FROM ATTACHMENT 5	2 CCNPP PA, TASK or ST	3 ALTERNATIVE TO MANAGE COMPONENT ARDM

Attachment 9

Effective Program Evaluation

SYSTEM NUMBER:_____ SYSTEM NAME: _____

COMPONENT ID: _____

_____

ARDM DESCRIPTION: _____

CCNPP PA OR TASK ID: _____

ALTERNATIVE METHOD: _____

Criterion 1: Effective programs must ensure identification and mitigation of age related degradation unique to license renewal for the SSCs identified as important to license renewal, or could, if they fail, prevent an SSC important to license renewal from performing its required function.

DISCOVERY DESCRIPTION/BASIS:

Required for completion of Step 6.9.1.3.

Is the DISCOVERY PA or Task frequency interval less than the shortest known failure time?

Does the PA or Task demonstrate historically that it is effective in mitigating aging degradation of components (i.e. has the aging mechanism caused an ITLR functional failure)?

Does the PA or Task identify and mitigate all relevant age management issues?

Attachment 9 (cont'd)

Criterion 2: Effective programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.

ASSESSMENT/ANALYSIS DESCRIPTION/BASIS:

Required for completion of Step 6.9.I.3.

Does the PA or Task have an action or alert value or condition parameter to determine the need for corrective action?

Does the action value or condition provide sufficient indication of degradation to ensure that there will not be an ITLR System functional failure prior to the next PA or Task?

CORRECTIVE ACTION DESCRIPTION/BASIS:

Required for completion of Step 6.9.I.3.

Does the PA or Task ensure that appropriate corrective action is taken?

Does the corrective action receive proper work prioritization, scheduled and completed on schedule, or positive alternative actions identified?

Does the PA or Task have a confirmation process that ensure corective action is taken?

Criterion 3: Effective programs must be implemented by the facility operating procedures and reviewed by the onsite review committee.

CONFIRMATION/DOCUMENTATION DESCRIPTION/BASIS:

Required for completion of Step 6.9.I.3.

Does the PA or Task have a review process?

Does the PA or Task have a change/revision process?

Does the PA or Task have an approval process?

Attachment 10

Source Document List

SYSTEM NUMBER: _____ SYSTEM NAME: _____

ID	TITLE	REVISION NUMBER	TYPE	DATE

Attachment 11
Existing Program Adequacy

SYSTEM NUMBER: _____ GROUP ID: _____ SYSTEM NAME: _____ _____	COMPONENT ID OR SUBCOMPONENT ID _____ _____ _____ _____ _____ _____

LIST OF APPLICABLE DOCUMENTS (NOTE: IF ADDITIONAL SPACES/LINES ARE NEEDED, USE A SECOND SHEET.)

	PA/TASK ID	NAME	REPLACEMENT FREQUENCY ON TIME / ON CONDITION / NA	PA FREQUENCY VALUE
DISCOVERY			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	
ASSESSMENT/ ANALYSES			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	
CORRECTIVE			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	
CONFIRMATION/ DOCUMENTATION			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	

Attachment 11 (cont'd)

CRITERIA REVIEW:

Criterion 1 - Adequate programs must ensure that the SSCs identified as important to license renewal and that contribute to the performance of a required function, or could, if they fail, prevent an SSC important to license renewal from performing its required function will be replaced or refurbished before they are subject to aging unique to license renewal.

1.1 Evaluate the PA or task for adequate technical detail(s)

1.1.1 Is the DISCOVERY PA or task frequency interval less than the shortest ITLR System Function failure time?

— YES — NO — NA

Description/Basis: *(The response to this question is "YES" for a component failure less than the "Discovery PA or Task" if an identified component failure is not an ITLR System Function failure. An example of an acceptable basis would be: "The component failure disabled one channel of the multi-channeled system but did not prevent the multi-channel system from performing its ITLR System Function.")*

1.1.2 Does the PA or task demonstrate historically that it is adequate in maintaining the important function(s) for the identified groupings (i.e. the component failures have not caused ITLR system functional failures prior to replacement)?

— YES — NO — NA

Description/Basis: *(For a program which allows the component to fail before replacement/refurbishment of the component, component historical data does not provide a measure as to the program's adequacy in maintaining ITLR system functions. Therefore, where a component failure is the means for initiating replacement/refurbishment of the component and the component failure does not cause an ITLR System Function failure, the answer would be "NA." Where a component is ITLR and its failure causes an ITLR System Function failure, the answer would be "NO." Whether the component's failure is discovered by the program under evaluation or some other program does not change the response as to whether the program is adequate in maintaining ITLR system functions. For "replacement program potential" components, provide basis contained in previous component evaluation result and review of the component work order history).*

Attachment 11 (cont'd)

1.1.3 Historically, are all maintenance preventable ITLR System functional failures detected by the PA or task?

— YES — NO — NA

Description/Basis: *(A component failure which is discovered by a means other than the program under evaluation is acceptable when the component failure did not cause an ITLR System Function failure and the program under evaluation would have initiated a replacement/refurbishment action for the failed component).*

Criterion 2 - Adequate programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.

2.1 For PAs or tasks that do not have a fixed interval of time for replacement:

2.1.1 Does the PA or task have an action or alert value or condition parameter to determine the need for corrective action?

— YES — NO — NA

Action/Condition: *(For "replacement program potential" components address whether the action or alert value is appropriate for the component being evaluated. If not, respond "NO".)*

Attachment 11 (cont'd)

2.1.2 Does the action value or condition provide sufficient indication of degradation to reasonably conclude that there will not be an ITLR system functional failure prior to the next PA or task?

— YES — NO — NA

Basis/Reference:

2.1.3 Does the PA or task ensure that appropriate corrective action is taken?

— YES — NO — NA

Basis/Reference:

2.2 For all PAs or tasks:

2.2.1 Does the corrective action receive proper work prioritization, scheduling and completion on schedule, or are positive alternative actions identified?

— YES — NO — NA

Basis/Reference:

2.2.2 Does the PA or task have a confirmation process that ensures corrective action is taken?

— YES — NO — NA

Basis/Reference:

Attachment 11 (cont'd)

Criterion 3[3] - Adequate programs must be implemented by the facility operating procedures and reviewed by the onsite review committee.

3.1 Evaluate the implementation and review process of the PA or task.

NOTE:
If the PA or task is covered by one of the following site procedures, then answers to 3.1.1, 3.1.2, and 3.1.3 are YES.
CCI-100 covers implementation of all CCIs.
PR-1-100 covers implementation of Administration and Tech. Spec. related programs.
PR-1-101 covers implementation of PMs, ETPs, FTs, PTPs, STPs.

3.1.1 Does the PA or task have a review process?

— YES — NO — NA

Basis/Reference:

3.1.2 Does the PA or task have a change/revision process?

— YES — NO — NA

Basis/Reference:

3.1.3 Does the PA or task have an approval process?

— YES — NO — NA

Basis/Reference:

[3] These items will apply to upper level BG&E procedures that develop, implement, and control lower level PA(s) and tasks.

Program/Activity (PA) Modifications

SYSTEM NUMBER: _____ SYSTEM NAME: _____

PA/TASK OR GROUP ID: _____

DOCUMENT/ SUBTASK	PRESENT DESCRIPTION	NEW/REVISED CORRECTIVE ACTION/RECOMMENDATION

Attachment 13

Independent Technical Review Procedure

Independent Technical Review. The Evaluator and Verifier will perform the following steps to provide the requisite independent technical review for the Component Aging Evaluation.

> CAUTION:
>
> The Verifier and Evaluator cannot be the same individual.

A. **Work Product Preparation**

1. Upon completion of the evaluation, the Evaluator will assemble the completed package and attach an Attachment 14.
2. The Evaluator will fill in the top section and sign and date the Attachment 14.
3. The Evaluator will present the package to the designated verifier.

B. **Work Product Review**. When directed by this Procedure, the Verifier shall review the work products generated in each section as follows.

1. **FOLLOW** the steps presented in the respective sections of this Procedure.
2. **EITHER CONFIRM** that the Evaluator's results are accurate **OR CHALLENGE** what the Evaluator has recorded.
   a. **ASSURE** that the steps of the procedure were implemented correctly.
   b. **ASSURE** that the information reviewed is accurate.
   c. **ASSURE** that the level of detail is satisfactory.

C. **Comments and Comment Resolution**. The Verifier or Evaluator as specified shall perform the following steps.

1. The Verifier shall **PROVIDE** any comments to the Evaluator in writing on the Independent Technical Review Record (Attachment 14).
   a. Identify each comment with a sequential number.
   b. Indicate applicable page, paragraph, section, etc. of document being reviewed.
   c. Indicate with a check in the response not required column if a response will not be required by the evaluator.
   d. Provide a concise description of the specific comment. Provide satisfactory re-wording where appropriate. Use Attachment 15 as continuation sheet(s).
   e. Number all pages (Attachment 14 and 15(s)).
   f. Sign and date Attachment 14 after completion of verification.
2. The Evaluator shall **RESOLVE** all comments in writing on the same form unless the verifier indicated Response Not Required. The Evaluator will re-sign the Attachment 14 indicating concurrence with comments.
3. The Verifier shall **CONCUR** that each comment has been satisfactorily resolved by the Evaluator and so **INDICATE** by signing the Independent Technical Review Form in the Verifier Concurrence block provided.
4. **IF** any comments cannot be satisfactorily resolved between the Evaluator and Verifier, **THEN** the Verifier will **INITIATE** a Technical Problem Report in accordance with reference 3.2.A.

Attachment 14

Device Type:_____	INDEPENDENT TECHNICAL REVIEW RECORD				Page ____ of ____
Document Title:				Document ID:	Date:
Item No.	**Page/Para**	**Resp Not Req'd**	**Comments (Provide rewording, if possible)**	**Comment Accepted**	**Proposed Comment Resolution**
Evaluator:			Date	Evaluator Concurrence:	Date:
Verifier:			Date:	Verifier Concurrence:	Date:

Attachment 15

Device Type_____	INDEPENDENT TECHNICAL REVIEW RECORD CONTINUATION SHEET	Page ____ of ____

Document Title:	Document ID:	Date:

Item No.	Page/Para	Resp Not Req'd	Comments (Provide rewording, if possible)	Comment Accepted	Proposed Comment Resolution

Attachment B

Component Aging Evaluation Procedure: LCM-16
Rev 1, Change 0

CALVERT CLIFFS NUCLEAR POWER PLANT

UNITS 1 AND 2

PROCEDURE LCM-16

LCM COMPONENT AGING EVALUATION

REVISION 1

Action	Signature	Name-Printed	Date
Prepared By	J R Schott	J. R. Schott	02-10-93
Technical Reviewer	B M Tilden	B. M. Tilden	3/25/93
Functional Reviewer	D J DiBello	D. J. DiBello	3/26/93
Supervisory Approval	B W Doroshuk	B. W. Doroshuk	3-29-93
QA Approval (If Applicable)	N/A	N/A	
POSRC Review	Mtg No: 93-018	N/A	
Plant General Manager Approval	N/A	Delayed Implementation Approved YES NO N/A	
Effective Date	Pre-Implementation Requirements Completed YES (N/A)	Release for Distribution Signature: D J DiBello	3-30-93

EXECUTIVE SUMMARY SHEET

Revision	Change Number	Summary of Change
0	0	Initial Issue
0	1	Editorial Revisions
1	0	The LCM Component Aging Evaluation now develops the matrices for components dispositioned as long-lived (matrix) by LCM-10. The attributes for programs identified to manage the ARDMs for the long-lived components will be evaluated for their effectiveness in mitigating aging degradation potentially unique to license renewal. The specific changes to the LCM-16 procedure are: a. Development of ARDM matrices have been incorporated from LCM-10. b. The Program Adequacy Evaluation has been removed and incorporated in LCM-10. c. The philosophy behind the modified LCM process for evaluation of component aging has been incorporated into the procedure. d. Incorporated TPRs 91-202, 92-059, 92-073, 92-099, 92-100, 92-119, 92-122, 92-123, and 92-154.

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3	0	26	0		
4	0	27	0		
5	0	28	0		
6	0	29	0		
7	0	30	0		
8	0	31	0		
9	0	32	0		
10	0	33	0		
11	0	34	0		
12	0	35	0		
13	0	36	0		
14	0	37	0		
15	0	38	0		
16	0	39	0		
17	0	40	0		
18	0	41	0		
19	0	42	0		
20	0	43	0		
21	0	44	0		
22	0	45	0		
23	0	46	0		

1.0 PURPOSE

The Component Aging Evaluation Procedure governs the Detailed Component Aging Evaluation Task of the Baltimore Gas & Electric Integrated Plant Assessment for Aging Process.

The Detailed Component Aging Evaluation Task identifies plausible age related degradation mechanisms for each component, evaluates the effects of the mechanisms on the important to License Renewal (ITLR) functions of the components and evaluates whether the aging is unique to license renewal. Attributes for programs to manage the effects of aging degradation are developed and evaluated to determine their effectiveness to manage the aging degradation.

2.0 SCOPE

This LCM Procedure governs the ITLR component aging evaluation process used for all ITLR systems at Calvert Cliffs Nuclear Power Plant Units 1 and 2. Specific instructions are provided for reviewing and referencing Source Documents and for documenting each step of the process.

Work products generated by this procedure are reviewed and approved in accordance with established QA Review and Approval processes. The ITLR Component Aging Evaluation Process is a safety related task. An independent technical review is required to verify results.

3.0 REFERENCES

3.1 Developmental References

A. Baltimore Gas and Electric Life Cycle Management/License Renewal Program Management Plan, Baltimore Gas and Electric Co., Revision 2.0, April 30, 1992

B. BG&E Quality Assurance Manual - Revision 10, dated March 25, 1991

C. Life Cycle Management Program - Methodology for Integrated Plant Assessment Volume 1: Screening Methodology, dated April 7, 1992

D. Life Cycle Management Program - Methodology for Integrated Plant Assessment Volume 2: Evaluation Methodology, draft dated November 6, 1992

E. LCM Component ITLR Screening of Systems Procedure, Procedure No. LCM-12, Rev. 2, dated April 13, 1992

F. Nuclear Power Plant License Renewal Rule, 10 CFR Part 54, dated January 13, 1992

G. Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses, Draft NRC Regulatory Guide No. DG-1009, dated December 1990

H. Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants, Draft NUREG No. 1299, dated November 1990

3.2 Performance References

A. LCM Program Instruction: Technical Problems Reporting

B. Calvert Cliffs Nuclear Power Plant, Quality List Manual

C. Calvert Cliffs Updated Final Safety Analysis Report (UFSAR)

D. System and Structure ITLR Screening Results

E. Component Level ITLR Screening Results

F. Calvert Cliffs Nuclear Power Plant Preventive Maintenance Cards

G. Calvert Cliffs Nuclear Power Plant Surveillance Test Procedures

H. Calvert Cliffs Nuclear Power Plant In Service Inspection Procedures

I. Calvert Cliffs Nuclear Power Plant Equipment Qualification Design Manual

J. Calvert Cliffs Nuclear Power Plant Technical Specifications

K. Calvert Cliffs Nuclear Power Plant Operating Procedures

L. Calvert Cliffs Nuclear Power Plant Operating Instructions

M. Calvert Cliffs Nuclear Power Plant Drawings

N. Calvert Cliffs Nuclear Power Plant Design Basis Document (if available)

O. Calvert Cliffs Nuclear Power Plant Equipment Technical Database information

P. Calvert Cliffs Nuclear Power Plant Nuclear Optical Records Management System (NORMS)

Q. LCM Procedure 10 LCM Component Evaluation

4.0 PREREQUISITES

4.1 System and Structure ITLR Screening Results

In the System Screening Procedure, LCM-12, all plant systems are evaluated to determine which are ITLR and to identify the functional requirements of the ITLR systems. System Screening results shall be available prior to the start of this procedure. The System Screening information relevant to this procedure includes:

- System Name and Number
- System Description
- System Functional Requirements
- System Bases for ITLR Determination
- Listing of Source Documents

4.2 Component Level ITLR Screening Results

In the Component Screening Procedure, LCM-11, each system component is evaluated to determine whether it is ITLR. Component Screening results shall be available prior to the start of this procedure. For those components identified as being ITLR, the specific information from the Component Screening task includes:

- ITLR System Functions and Numbers
- Equipment ID Number
- Component Description
- Component ITLR Designation
- System Function Numbers for Each Component
- Identification of Source Documents Used

4.3 Component Evaluation and Component Aging Evaluation Results

In the Component Evaluation Procedure, LCM-10, ITLR Components are evaluated to determine if they are potentially subject to aging unique to license renewal. Components which are subject to regular inspection or testing and are replaced or refurbished based on predetermined criteria are said to be short-lived and therefore are not subject to aging unique to license renewal. Component Evaluation results, both historical and current system, shall be available prior to the start of this procedure. The Component Evaluation and Component Aging Evaluation historical information relevant to this procedure includes:

- Device Type Disposition Record which provides a list of components potentially subject to aging unique to license renewal (Attachment 1).
- Grouping Information (Attachments 3 and 4).
- Matrix information (Attachments 5, 6, and 7).

4.4 Plant Configuration Control Documents

Additional information is available which may clarify or assist in the LCM Component Aging Evaluation:

- The following manuals:
  1. The Q-List
  2. The Updated Final Safety Analysis Report (UFSAR)
  3. The Technical Specifications
- Applicable system documents:
  1. System Operating Procedures
  2. P&IDs
  3. Logic Diagrams
  4. Electrical Drawings
  5. OM Drawings
  6. Schematic Drawings
  7. Equipment Location Drawings

- Copies of the following lists:

  1. BG&E Approved ARDM Documents[1]
  2. Device Type Codes and Descriptions

- Information from the following sources to verify design/licensing basis and identify components to the manufacturer, model and design:

  1. NUCLEIS
  2. The Design Bases Consolidation System
  3. NORMS
  4. CCNPP Technical Library Documents
  5. Current Licensing Basis (CLB) compilation

4.5 Evaluator Qualifications

All evaluators will be qualified to the extent necessary to perform their specific tasks. This qualification should include general indoctrination training on the LCM Program and specific training on the Component Aging Evaluation Process.

5.0 PRECAUTIONS

All source material used in conjunction with this procedure will consist of documents approved by the LCM Program Staff or obtained directly from the CCNPP Document Control Room.

Task results obtained through performance of this procedure will be referenced to the most recent version of the reference material available at the time that the task is begun. The specific revision status of all reference material will be recorded whenever the procedure calls for recording a reference.

Task results, including the ITLR Component Evaluation Data Tables, the ITLR Component Evaluation database, matrices and supporting attachments, and program effectiveness evaluations will become LCM controlled documents.

This procedure along with all products produced by the application of this procedure are the property of BG&E. They shall not be distributed or used without the expressed written permission of BG&E.

6.0 PROCEDURE

The LCM Component Aging Evaluation procedure is structured to select a device type and proceed through the entire ARDM process of establishing PLAUSIBLE ARDMs prior to evaluating the next device type. When all device types have been evaluated for PLAUSIBLE ARDMs, aging management practices for the ARDMs are identified and evaluated to determine their effectiveness in managing the aging degradation potentially unique to license renewal.

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[1] BG&E Approved ARDM Documents - a list of source documents which are approved by BG&E to resolve the plausibility of component ARDM combinations. This list is supplemented throughout the evaluation process as new reference material is approved.

6.1 Create a Potential ARDM List

The evaluator has determined that the evaluation of the component will require identifying the Component-ARDM combinations. This step directs the evaluator to identify all the ARDMs that should be considered when evaluating the specific Device Type that is applicable to the component.

A. **REVIEW** the Device Type Disposition Record, Attachment 1, and **SELECT** a device type with components designated as "Matrix Develop" or "Matrix Different" in the Method column. **IF** all device types with components designated by these codes have been evaluated, **THEN PROCEED** to Step 6.9.

NOTE:

An ARDM is considered POTENTIAL for a given device type if the evaluator concludes that it could occur in generic applications of the device type throughout the plant with conducive environmental service conditions.

B. **DEVELOP** a POTENTIAL ARDM List, Attachment 7, for the Device Types dispositioned "Matrix Develop" as follows:

1. **RECORD** the Device Type at the top of the list.

2. **RECORD**, under the ARDM column, all ARDMs listed in the latest version of Appendix A to Draft Regulatory Guide-1009, Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plants.

3. **REVIEW** other industry documents and **RECORD** additional ARDMs that may be considered POTENTIAL ARDMs for the Device Type. Documents reviewed should include the following:

   a. NUMARC Industry Reports
   b. NRC Nuclear Plant Aging Research (NPAR) Program Reports
   c. EPRI Reports
   d. DOE Reports
   e. Other documents that in the opinion of the evaluator provide applicable aging mechanism evaluation

4. **REFER** to Draft Regulatory Guide-1009 Appendix A and other source documents, and **REVIEW** the description of each ARDM.

5. **IF** the ARDM description indicates that the ARDM could **NOT** be POTENTIAL for the Device Type, **THEN RECORD** the following on the POTENTIAL ARDM List, Attachment 7:

   a. "NO" in the POTENTIAL column.
   b. "NOT Applicable to Device Type" and the basis for that conclusion in the Description/Justification column.
   c. The source document(s) used to reach this conclusion in the Source column. This

document should be one of the approved source documents.

d. "YES" in the POTENTIAL column of all the remaining ARDMs.

> **NOTE:**
>
> An ARDM is considered PLAUSIBLE only if a combination of component and sub-component materials of construction and environmental service factors exist for a specific device type application. Evaluation of ARDMs for plausibility in Section 6.5 requires identification of all required attributes (materials and environmental service conditions).

6. **REFER** to any of the following sources to identify the materials and conditions that must exist for the ARDM to be considered PLAUSIBLE for the Device Type. This information will be utilized to screen the POTENTIAL ARDMs identified in Section 6.1 to determine the specific PLAUSIBLE ARDMs.

   a. Industry Information
   b. Technical Papers
   c. Text Books
   d. Design Codes
   e. System Experts

7. **RECORD** the following data on the POTENTIAL ARDM List, Attachment 7:

   a. A description of the materials and environmental service factors that would make the ARDM PLAUSIBLE in the Description/Justification column.
   b. All source documents used to develop the description.

C. **DEVELOP** a POTENTIAL ARDM List, Attachment 7, for the Device Types dispositioned "Matrix Different" as follows:

1. **RECORD** the Device Type at the top of the list.

2. **RECORD**, under the ARDM column, all ARDMs listed on the previous component evaluation results Attachment 7 identified in the Document ID column of the Device Type Disposition Record.

3. **REVIEW** other industry documents and **RECORD** additional ARDMs that may be considered POTENTIAL ARDMs for the Device Type. Documents reviewed should include the following:

   a. NUMARC Industry Reports
   b. NRC Nuclear Plant Aging Research (NPAR) Program Reports
   c. EPRI Reports
   d. DOE Reports
   e. Other documents that in the opinion of the evaluator provide applicable aging mechanism evaluation

4. **REFER** to Draft Regulatory Guide-1009 Appendix A, other source documents, and previous Attachment 7s for this equipment type (if applicable) and **REVIEW** the description of each ARDM.

5. **IF** the ARDM description indicates that the ARDM could **NOT** be POTENTIAL for the Device Type, **THEN RECORD** the following on the POTENTIAL ARDM List, Attachment 7:

   a. "NO" in the POTENTIAL column.
   b. "NOT Applicable to Device Type" and the basis for that conclusion in the Description column.
   c. The source document(s) used to reach this conclusion in the Source column. This document should be one of the approved source documents.
   d. "YES" in the POTENTIAL column of all the remaining ARDMs.

> NOTE:
>
> An ARDM is considered PLAUSIBLE only if a combination of component and sub-component materials of construction and environmental service factors exist for a specific device type application. Evaluation of ARDMs for plausibility in Section 6.5 requires identification of all required attributes (materials and environmental service conditions).

6. **REFER** to any of the following sources to identify the materials and conditions that must exist for the ARDM to be considered PLAUSIBLE for the Device Type. This information will be utilized to screen the POTENTIAL ARDMs identified in Section 6.1 to determine the specific PLAUSIBLE ARDMs.

   a. Industry Information
   b. Technical Papers
   c. Text Books
   d. Design Codes
   e. System Experts

7. **RECORD** the following data on the POTENTIAL ARDM List, Attachment 7:

   a. A description of the materials and environmental service factors that would make the ARDM PLAUSIBLE in the Description/Justification column.
   b. All source documents used to develop the description.

6.2 Evaluate Effectiveness of Groups and Sub-Groups

The Evaluator shall determine effective methods for evaluating Component-ARDM combinations using either components, component groups, or sub-groups. The Evaluator will develop component groups and sub-component groups as appropriate based on attributes described in the appropriate source documents.

A. **EVALUATE** components of the device type for grouping by performing the following:

1. **IF** any design, environmental or functional attributes of the components in the device type are distinct enough that such differences would warrant dividing the device type into groups, **THEN**:

   a. **ESTABLISH** the attributes which will determine groups.

   b. **COMPARE** the Grouping Attributes established in Step 6.2.A.1.a with the attributes found on the Bill of Materials and Critical Design Characteristics printouts for the system components currently being evaluated.

      (1) **IF** the current component printouts are missing information which corresponds to the grouping attributes, **THEN REFER** to technical manuals, plant drawings or other reference material as necessary to locate the needed information for the current component.

      (2) **ANNOTATE** this information on the Bill of Materials and Critical Design Characteristics printouts as appropriate.

   c. **DIVIDE** the components of the device type into groups according to their value for the grouping attributes.

   d. **PREPARE** a Component Grouping Summary Sheet, Attachment 3, for each identified group by **RECORDING** the following:

      (1) Group ID Number using the following format: System Number followed by Device Type followed by a sequential number.
      (2) The applicable grouping attributes which will be utilized to evaluate the ARDMs.
      (3) The equipment ID of the components which will comprise the group.

B. **EVALUATE** components and component groups to determine if they should be broken down into sub-components or sub-groups for effectiveness in identifying plausible Component-ARDM combinations.

1. **IF** the components of the group are made of distinct sub-components, **THEN DETERMINE** if dividing the components into sub-components is beneficial. **IF** the components should not be sub-divided into sub-components, **THEN PROCEED** to Step 6.3.

2. **SELECT** one of the components of the group being evaluated.

3. **OBTAIN** the Bill of Materials printout or the detail drawing for the component and **IDENTIFY** the parts that makeup the component.

4. **REVIEW** the component functions and **IDENTIFY** sub-components by considering the following criteria:

   a. Constructed of a single material
   b. Identified by the Bill of Materials printout or detail drawing
   c. Associated with a single ITLR function

5. **RECORD** the identified sub-components on Attachment 4 in the Sub-Component/Sub-Group ID column.

C. **EVALUATE** sub-components to identify those that support ITLR functions by performing the following:

1. **IDENTIFY** the specific component function(s) that are applicable to the identified sub-components.

2. **RECORD** on the Sub-Component/Sub-Group Identification, Attachment 4, the specific component detailed function(s) that are applicable to the identified sub-components in the ITLR Function column.

3. **IF** any sub-component does NOT have applicable specific ITLR component functions, **THEN RECORD** "NONE" on Attachment 4 in the applicable sub-component ITLR Function column.

NOTE:

A Program/Activity (PA) is considered a replacement program if it meets one of the following criteria:

1. The sub-component is replaced or refurbished after a set time frame has expired.
2. The sub-component is replaced or refurbished when a measured parameter reaches a specific limit.

D. **IDENTIFY** sub-components associated with Replacement/Refurbishment Programs and **FOR EACH** sub-component with identified ITLR functions:

1. **REVIEW** the List of Programs printout and applicable Program/Activity documentation and **IDENTIFY** the PAs associated with the sub-component.

2. **IF** no PAs are identified for a sub-component, **THEN PROCEED** to Step 6.2.E.

3. **IF** a PA is identified as a Replacement/Refurbishment program for a sub-component, **THEN PERFORM** the following:

a. **RECORD** the following on Attachment 1:

(1) Sub-component ID in the Equipment ID column below the component.
(2) Group ID in the Group ID column.
(3) "Replacement Program Sub-Component" in the Method column.
(4) PA ID Number in the Document ID column.

b. **RECORD** the following on Attachment 4:

(1) "Replacement Program" in the Manufacturer column.
(2) PA ID Number in the Model/Serial Number column.

c. **NOTIFY** the System Task Leader of sub-components dispositioned by a Replacement/Refurbishment program.

E. **REVIEW** the component Bill of Materials printout or detail drawing **FOR ALL ITLR** sub-components **NOT associated with a replacement program to identify sub-component** information. **RECORD** the following on Attachment 4:

1. Sub-component Manufacturer in the Manufacturer column.
2. Manufacturer Model or other identification number in the Model/Serial Number column.
3. Primary material of construction in the Material column.
4. Source document for this information in the Source Document column.

6.3 Create an ARDM Matrix

The evaluator will create an ARDM matrix for the device type that will be used to document the plausibility of ARDMs to the component or its ITLR sub-components. The ARDM Matrix will be developed on Attachment 5 as follows:

A. **RECORD** System Number, System Name, Equipment Type, and Device Type at top of form.

B. **REFER** to the POTENTIAL ARDM List, Attachment 7, and **RECORD** all the POTENTIAL ARDMs in the ARDM column.

C. **RECORD** all the components (groups) or ITLR sub-components (sub-groups) of the device type that have NOT been eliminated from ARDM evaluation along the top horizontal row of the group or sub-group ID column.

NOTE:

The evaluator should review previous component evaluation results for components dispositioned "Matrix Different". Evaluation of ARDMs which are identical (e.g. - attributes are identical) should ensure consistency between the disposition of individual ARDMs.

6.4 Evaluate ARDMs for Industry Information Identifying ARDM as NOT-PLAUSIBLE

The evaluator will review available industry information on the component/sub-component and determine if the Component-ARDM combination has already been determined to be NOT-PLAUSIBLE.

A. **REVIEW** industry information related to the LCM of the Device Type.

B. **IDENTIFY** Component-ARDM combinations that have been identified as NOT-PLAUSIBLE.

NOTE:

Matrix codes use numbers either to identify NOT-PLAUSIBLE or NOT-UNIQUE ARDM-Component combinations and letters to identify PLAUSIBLE ARDM-Component combinations which can not be shown to be NOT-UNIQUE.

C. **IF** NOT-PLAUSIBLE ARDMs are identified, **THEN RECORD** the following on the Matrix Code List, Attachment 6, utilizing the next sequential code number:

1. The basis for concluding that the ARDM is NOT-PLAUSIBLE in the description column.
2. The industry document that was used to establish that basis in the source column.

D. **RECORD** the Matrix Code number in the ARDM Matrix, Attachment 5, at all the applicable locations.

6.5 Evaluate ARDMs for Plausibility of the Material and Environment

The evaluator will compare the component/sub-component material of construction and operating environment to the material and environment necessary for the ARDM to be considered PLAUSIBLE as documented on Attachment 7.

A. **REVIEW** the ARDM description from the POTENTIAL ARDM List, Attachment 7, for the Device Type.

B. **IDENTIFY** Component-ARDM combinations that are NOT-PLAUSIBLE because the ARDM does not occur in the material.

1. **COMPARE** the materials of construction for the component or sub-components to the ARDM descriptions on Attachment 7 and **IDENTIFY** the ARDMs that are NOT-PLAUSIBLE due to incompatible material.

2. **IF** NOT-PLAUSIBLE ARDMs are identified, **THEN RECORD** the following on the Matrix Code List, Attachment 6, utilizing the next sequential code number:

   a. "ARDM is NOT applicable to the Material" and basis for this determination in the description column.
   b. The source document used to reach this conclusion in the source column. This source document should be one of the documents referenced in the ARDM description documented in the POTENTIAL ARDM List, Attachment 7.

3. **RECORD** the Matrix Code number in the ARDM Matrix, Attachment 5, at all the applicable locations.

C. **IDENTIFY** Component-ARDM combinations that are NOT-PLAUSIBLE because the component's internal environmental conditions are NOT the environmental conditions necessary for the ARDM to occur.

1. **REFER TO** the component's interfacing systems and the UFSAR system descriptions and **IDENTIFY** any environmental parameters that may be applicable to the ARDMs.

2. **COMPARE** the interfacing environmental conditions of the component or sub-component to the ARDM descriptions and **IDENTIFY** the ARDMs that are NOT-PLAUSIBLE due to incompatible internal environmental conditions.

NOTE:

Bases should include assumptions made when considering the environmental service conditions. For example, if it was assumed that primary chemistry maintained a low level of oxygen in the primary coolant, this should be stated here. If the evaluation assumed that the instrument air dryers maintained a clean dry environment in the air piping, that assumption should be clearly stated.

3. **IF** NOT-PLAUSIBLE ARDMs are identified, **THEN RECORD** the following on the Matrix Code List, Attachment 6, utilizing the next sequential code number:

   a. "[The particular environmental parameter, such as temperature, pressure, system pH etc.] is NOT sufficient to perpetuate the ARDM" and the basis for that conclusion in the description column.
   b. The source document used to reach this conclusion in the source column. This document should be one of the documents referenced in the ARDM description documented in the POTENTIAL ARDM List.

4. **RECORD** the Matrix Code number in the ARDM Matrix, Attachment 5, at all the applicable locations.

D. **IDENTIFY** Component-ARDM combinations that are NOT-PLAUSIBLE because the component's external environmental conditions are NOT applicable to the environmental conditions necessary for the ARDM to occur.

1. **COMPARE** the external environmental conditions of the component or sub-component, based on component location, to the ARDM descriptions and **IDENTIFY** the ARDMs that are NOT-PLAUSIBLE due to incompatible external environmental conditions.

2. **IF** NOT-PLAUSIBLE ARDMs are identified, **THEN RECORD** the following on the Matrix Code List, Attachment 6, utilizing the next sequential code number:

   a. "[The particular environmental parameter, such as radiation levels, harsh environment conditions, exposure to chlorides etc.] is NOT sufficient to perpetuate the ARDM" and the basis for that conclusion in the description column.

b. The source document used to reach this conclusion in the source column. This document should be one of the documents referenced in the ARDM description documented in the POTENTIAL ARDM List.

3. **RECORD** the Matrix Code number on the ARDM Matrix, Attachment 5, at all the applicable locations.

6.6 Evaluate ARDMs for Effects on ITLR Functions

The evaluator will evaluate the effects of the ARDM and determine if the component's ITLR function(s) can be maintained.

A. **REVIEW** the ARDM description from the POTENTIAL ARDM List, Attachment 7.

B. **IDENTIFY** Component-ARDM combinations that are NOT-PLAUSIBLE because the ARDM will NOT prevent the component from performing its ITLR function given the materials which make up the component and the environment in which the component operates.

C. **IF** NOT-PLAUSIBLE ARDMs are identified, **THEN RECORD** the following on the Matrix Code List, Attachment 6, utilizing the next sequential code number:

1. "The ARDM does NOT prevent the ITLR function" and the basis for that conclusion in the description column.

2. The POTENTIAL ARDM List as the source document in the source column.

D. **RECORD** the Matrix Code number on the ARDM Matrix, Attachment 5, at all the applicable locations.

6.7 Evaluate ARDMs for Aging UTLR

The evaluator will attempt to identify Component-ARDM combinations which do not result in aging that is unique to license renewal.

A. **REVIEW** the ARDM description from the POTENTIAL ARDM List, Attachment 7.

B. **IDENTIFY** Component-ARDM combinations that are NOT-UNIQUE because the ARDM will not result in aging that is different in character or magnitude during the renewal period.

C. **IF** NOT-UNIQUE ARDMs are identified, **THEN RECORD** the following on the Matrix Code List, Attachment 6, utilizing the next sequential code number:

1. "The ARDM does not result in aging UTLR" and the basis for that conclusion in the description column.
2. The appropriate source document in the source column.

D. **RECORD** the Matrix Code number on the ARDM Matrix, Attachment 5, at all the applicable locations.

6.8 Verify ARDM Plausibility

The evaluator will attempt to verify that the un-addressed Component-ARDM combinations, identified in the matrix, are PLAUSIBLE.

A. **ATTEMPT** to verify the remaining Component-ARDM combinations listed in the matrix are PLAUSIBLE.

1. **REVIEW** industry information and available plant failure history related to the LCM of the Device Type.

2. **IDENTIFY** Component-ARDM combinations that have been determined to be PLAUSIBLE.

3. **IF** PLAUSIBLE ARDMs are identified, **THEN RECORD** the following information on the Matrix Code List, Attachment 6, utilizing the next sequential code letter:

   a. The basis for concluding that the ARDM is PLAUSIBLE in the description column.
   b. The document that was used to establish that basis in the source column.
   c. Suggested aging management alternatives which could effectively manage the PLAUSIBLE aging mechanisms in the description column.

4. **RECORD** the Matrix Code letter on the ARDM Matrix, Attachment 5, at all the applicable locations.

B. **IDENTIFY** the un-addressed Component-ARDM combinations by observing the blank locations in the matrix.

C. **IF** un-addressed Component-ARDM combinations remain in the matrix, **THEN** the evaluator will identify these Component-ARDM combinations to the System Task Leader.

1. Resolution may require intervention by an expert.

2. The evaluator will:

   a. **RECORD** suggested aging management alternatives for the un-addressed component vs. ARDM matrix locations in the Matrix Code List, Attachment 6.

   b. **ASSIGN** the next sequential matrix code letter to this alternatives list.

   c. **RECORD** the Matrix Code letter in the appropriate location in the ARDM Matrix, Attachment 5.

D. **RETURN** to Step 6.1.A.

6.9 Develop Attributes for an Effective Program

The ARDM Matrix, Attachment 5, outlines the plausible aging mechanisms that could affect the component function. This matrix defines the aging mechanisms which an effective program must control and provides recommended aging management alternatives. Step 6.9 will provide details from which new plant programs or modifications to existing plant programs can be made.

During this step the evaluator must compare the component ARDM against:

- Existing CCNPP PAs and tasks that could be used to address the ARDMs for a given component or group and
- Age management alternatives which may address the ARDMs

NOTE:

In order to achieve the most efficient use of this procedure, the evaluator should select a device type and evaluate all CCNPP programs associated with that device type until all components and groups within that device type have been reviewed.

A. **REVIEW** the Device Type Disposition Record, Attachment 1, and **SELECT** a component designated "Matrix Identical" in the Method column. **IF** all components or groups designated by this code have been evaluated, **THEN PROCEED** to Step 6.9.D.

B. **IF** the previous component aging evaluation results addressed the ARDMs with an existing PA,Task, or ST, **THEN**:

1. **REVIEW** the List of Programs printout and **IDENTIFY** a similar PA, Task, or ST.

2. **RECORD** the following information on Attachment 8:

   a. System Number
   b. System Name
   c. Component ID
   d. Plausible ARDM(s) from Attachment 5 in Column 1
   e. CCNPP PA, Task or ST Number (if applicable)
   f. Alternative to Manage Component ARDM (if applicable)

NOTE:

The evaluation of programs or aging degradation management alternatives must consider the following criteria.

1. Effective programs must ensure identification and mitigation of age related degradation unique to license renewal for the SSCs identified as important to license renewal, or could, if they fail, prevent an SSC important to license renewal from performing its required function.
2. Effective programs must contain acceptance criteria against which the need for corrective action will be evaluated and ensure that timely corrective action will be taken when these acceptance criteria are not met.
3. Effective programs must be implemented by the facility operating procedures and reviewed by the onsite review committee.

These criteria address the four elements of the program evaluation: Discovery, Assessment/Analyses, Corrective Action, and Confirmation/Documentation. The evaluator shall provide a description of the PA/Task or Age Management Alternative section which addresses a particular element. The basis for concluding the "effectiveness" shall be documented. Where an existing PA/Task is determined not to be effective in managing the aging, specific program modifications shall be provided. These modifications or the recommended age management alternatives must include the specific parameters/attributes required and the corresponding bases for ensuring that an effective program will be created.

3. **COMPLETE** Attachment 9 by performing the following:

   a. **RECORD** the following information at the top of Attachment 9:

      (1) System Number
      (2) System Name
      (3) Component ID
      (4) ARDM Description
      (5) CCNPP PA or Task ID

   b. **COMPLETE** the description/basis section by providing either references to applicable previous evaluation results for each of the following four elements or specific attributes required and bases for each of the following four elements:

      (1) Discovery
      (2) Assessment/Analyses
      (3) Corrective Action
      (4) Confirmation/Documentation

4. **IF** the previous evaluation results contained any program modifications, **THEN RECORD** the following on Attachment 12:

   (1) System Number
   (2) System Name

(3) PA or Task ID
(4) Document or Subtask ID
(5) Present Description (if applicable)
(6) New or Revised Recommendation with Basis

5. **RETURN** to Step 6.9.A.

C. **IF** the previous component aging evaluation results addressed the ARDMs with an Age Degradation Management Alternative, **THEN**:

1. **RECORD** the Age Degradation Management Alternative in column 3 of Attachment 8 for the applicable ARDM.

2. **COMPLETE** Attachment 9 by performing the following:

a. **RECORD** the following information at the top of Attachment 9:

(1) System Number
(2) System Name
(3) Component ID
(4) ARDM Description
(5) Alternative Method

b. **COMPLETE** the description/basis section by providing the specific attributes required and bases for each of the following four elements:

(1) Discovery
(2) Assessment/Analyses
(3) Corrective Action
(4) Confirmation/Documentation

3. **RETURN** to Step 6.9.A.

D. **REVIEW** the Device Type Disposition Record, Attachment 1, and **SELECT** a component for evaluation designated as "Matrix Develop" or "Matrix Different" in the Method column.

E. **IF** all components or groups designated by this code have been evaluated, **THEN PROCEED** to Step 6.10.

F. **OBTAIN** a copy of Attachment 5 for all components and groups within the Device Type selected.

G. **IDENTIFY** the ARDM(s) assigned to the component or group being evaluated.

1. **REVIEW** the data on Attachments 5 for all components and groups within the device type.

2. **RECORD** the following information at the top of Attachment 8:

a. System Number
b. System Name
c. Component ID or Group ID as applicable

3. **RECORD** each PLAUSIBLE ARDM listed on Attachment 5 in Column 1 of Attachment 8.

H. **SELECT** an ARDM from the list created on Attachment 8. **IF** all ARDMs for the component or group have been reviewed, **THEN RETURN** to Step 6.9.D.

I. **REVIEW** Attachments 5 and 6 and PA/Task documentation for the same or similar device types and **DETERMINE** if an existing PA, Task, or ST will address the management of the ARDM.

1. **IF** NO PA, Task, or ST can be identified which could be adopted to manage this ARDM **THEN PROCEED** to STEP 6.9.J.

2. **IF** in the opinion of the evaluator the ARDM could be managed by an existing PA, Task or ST, **THEN RECORD** the PA, Task, or ST ID number in Column 2 of Attachment 8 next to the ARDM under review.

NOTE:

The evaluation of programs or aging degradation management alternatives must consider the following criteria:

1. Effective programs must ensure identification and mitigation of age related degradation unique to license renewal for the SSCs identified as important to license renewal, or could, if they fail, prevent an SSC important to license renewal from performing its required function.
2. Effective programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.
3. Effective programs must be implemented by the facility operating procedures and reviewed by the onsite review committee.

These criteria address the four elements of the program evaluation: Discovery, Assessment/Analyses, Corrective Action, and Confirmation/Documentation. The evaluator shall provide a description of the PA/Task or Age Management Alternative section which addresses a particular element. The basis for concluding the "effectiveness" shall be documented. Where an existing PA/Task is determined not to be effective in managing the aging, specific program modifications shall be provided. These modifications or the recommended age management alternatives must include the specific parameters/attributes required and the corresponding bases for ensuring that an effective program will be created.

3. **COMPLETE** Attachment 9 by performing the following:

a. **RECORD** the following information at the top of Attachment 9:

(1) System Number
(2) System Name
(3) Component ID
(4) ARDM Description

(5) CCNPP PA or Task ID

b. **COMPLETE** the description/basis section by providing responses to the italicized questions (i.e. Yes or No with basis) for each of the following four elements:

(1) Discovery
(2) Assessment/Analyses
(3) Corrective Action
(4) Confirmation/Documentation

c. **FOR EACH** question that was answered "No", **RECORD** the following information on Attachment 12:

(1) System Number
(2) System Name
(3) PA or Task ID
(4) Document or Subtask ID
(5) Present Description (if applicable)
(6) New or Revised Corrective Action Recommendation with Basis for how this question will be answered "Yes."

4. **RETURN** to Step 6.9.H.

NOTE:

At this point the evaluator has determined that some of the PLAUSIBLE ARDM(s) could be managed by the use of an existing CCNPP PA, Task or practice. The remaining ARDM(s) will need to be managed by the definition of new age degradation management activities or practices.

J. **IF** the evaluator can not identify an existing PA/Task to manage this ARDM, **THEN REFER** to Attachment 6 and use engineering judgement to develop and recommend an Age Degradation Management Alternative that could manage the ARDM.

1. **RECORD** in column 3 on Attachment 8 the Age Degradation Management Alternative next to the ARDM under review.

2. **COMPLETE** Attachment 9 by performing the following:

a. **RECORD** the following information at the top of Attachment 9:

(1) System Number
(2) System Name
(3) Component ID
(4) ARDM Description
(4) Alternative Method

b. **COMPLETE** the description/basis section by providing the specific attributes required and bases for each of the following four elements:

(1) Discovery
(2) Assessment/Analyses
(3) Corrective Action
(4) Confirmation/Documentation

K. **IF** the evaluator can not develop an age degradation management alternative, **THEN REVISE** the Method column on Attachment 1 to read "On Hold - UTLR".

L. **RETURN** to Step 6.9.H.

6.10 Perform Independent Technical Review

An Independent Technical Review of the results completed in the previous steps must be conducted in accordance with the steps of Attachment 13.

7.0 POST-PERFORMANCE ACTIVITIES

7.1 Assemble and Deliver Work Products

The purpose of this section is to assemble the work products into packages for review and signature. The Evaluator or Task Manager performs each step in Section 7.0.

A. **PREPARE** a cover letter to transmit the work products.

B. **ASSEMBLE** all work products and the Independent Technical Review Record(s) into a package.

C. **TRANSMIT** the package and cover letter to the LCM Evaluations Engineer for review and approval.

7.2 Enter Results Into LCM DATA Software System

The purpose of this section is to initiate the transaction between the technical evaluation task and the information processing task of storing the evaluation results in an easily retrievable format. The System Task Leader shall perform the following steps:

A. **PROVIDE** the Aging Matrix Evaluation Sheets to the LCM Information Systems Engineer.

B. **ASSEMBLE** and **PROVIDE** Source Document List, Attachment 10, containing reference material used as input for the component aging evaluation.

8.0 BASES

There are no specific bases for this procedure other than those listed in the Developmental References Section.

9.0 RECORDS

Records generated by this Procedure shall be captured and controlled. Prior to transferring records to Plant History for retention, legibility and completeness of the records shall be verified by

the transmitting organization.

All products of this Procedure will be delivered to the LCM Program Administrator for serialization.

All products of this Procedure are permanent QA records which must be retained for the entire license renewal term.

10.0 ATTACHMENTS

NOTE:

All attachment forms shall serve as sample formats only. Changes in format are allowed in the execution of the procedure as long as the information content of the form remains constant. The LCM procedure which provides input to the attachment is referenced in parentheses.

Attachment 1	Device Type Disposition Record (LCM-10,16)
Attachment 2	Development of Potential Program (LCM-10)
Attachment 3	Component Grouping Summary Sheet (LCM-10,16)
Attachment 4	Sub-Component/Sub-Group Identification (LCM-10,16)
Attachment 5	ARDM Matrix (LCM-10,16)
Attachment 6	Matrix Code List (LCM-10,16)
Attachment 7	Potential ARDM List (LCM-10,16)
Attachment 8	Development Of Attributes For An Effective Program (LCM-16)
Attachment 9	Effective Program Evaluation (LCM-16)
Attachment 10	Source Document List (LCM-10,16)
Attachment 11	Existing Program Adequacy (LCM-10)
Attachment 12	Program/Activity (PA) Modifications (LCM-10,16)
Attachment 13	Independent Technical Review Procedure (LCM-10,16)
Attachment 14	Independent Technical Review Record (LCM-10,16)
Attachment 15	Independent Technical Review Record Continuation Sheet (LCM-10,16)

Attachment 1

Device Type Disposition Record

SYSTEM NUMBER: _____ SYSTEM NAME: _____ REPORT DATE: _____

Device Type	Equipment ID	Group ID	Method	Document ID

Attachment 2

Development of Potential Program

Potential Program ID: _____

Model Program PA/Task ID: _____

SUBTASKS (ST)

ST#	Description	Equipment ID	Data Parameter	Alert Value	Alert Bases	Corrective Action

Attachment 3

Component Grouping Summary Sheet

GROUP ID NUMBER: _____

GROUP ATTRIBUTES:

1. Device Type: _____
2. Vendor: _____
3. Model Number: _____
4. Material: _____
5. Internal Environment: _____
6. External Environment: _____
7. Function: _____
8. Name Plate Data:

PARAMETER	VALUE
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Attachment 4

Sub-Component/Sub-Group Identification

SYSTEM NUMBER: _____ SYSTEM NAME: _____

EQUIPMENT ID: _____ GROUP ID: _____

Sub-Component/ Sub-Group ID	Manufacturer	Model/ Serial Number	Material	Source Document	ITLR Function(s)	Function Reference(s)
A.						
B.						
C.						
D.						
E.						
F.						

Attachment 5

ARDM Matrix

SYSTEM NUMBER: _____ SYSTEM NAME: _____

EQUIPMENT TYPE: _____ DEVICE TYPE: _____

	GROUP OR SUB GROUP ID				
ARDMs					

Attachment 6

Matrix Code List

SYSTEM NUMBER:_____ SYSTEM NAME:_____

CODE	DESCRIPTION	SOURCE

Attachment 7
Potential ARDM List
DEVICE TYPE: _____

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE

Development of Attributes for an Effective Program

SYSTEM NUMBER: _____ SYSTEM NAME: _____

COMPONENT ID: _____ GROUP ID: _____

1 PLAUSIBLE ARDM FROM ATTACHMENT 5	2 CCNPP PA, TASK or ST	3 ALTERNATIVE TO MANAGE COMPONENT ARDM

Attachment 9

Effective Program Evaluation

SYSTEM NUMBER:_____ SYSTEM NAME: _____

COMPONENT ID: _____

_____

ARDM DESCRIPTION: _____

CCNPP PA OR TASK ID: _____

ALTERNATIVE METHOD: _____

Criterion 1: Effective programs must ensure identification and mitigation of age related degradation unique to license renewal for the SSCs identified as important to license renewal, or could, if they fail, prevent an SSC important to license renewal from performing its required function.

DISCOVERY DESCRIPTION/BASIS:

Required for completion of Step 6.9.1.3.

Is the DISCOVERY PA or Task frequency interval less than the shortest known failure time?

Does the PA or Task demonstrate historically that it is effective in mitigating aging degradation of components (i.e. has the aging mechanism caused an ITLR functional failure)?

Does the PA or Task identify and mitigate all relevant age management issues?

Attachment 9 (cont'd)

Criterion 2: Effective programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.

ASSESSMENT/ANALYSIS DESCRIPTION/BASIS:

Required for completion of Step 6.9.I.3.

Does the PA or Task have an action or alert value or condition parameter to determine the need for corrective action?

Does the action value or condition provide sufficient indication of degradation to ensure that there will not be an ITLR System functional failure prior to the next PA or Task?

CORRECTIVE ACTION DESCRIPTION/BASIS:

Required for completion of Step 6.9.I.3.

Does the PA or Task ensure that appropriate corrective action is taken?

Does the corrective action receive proper work prioritization, scheduled and completed on schedule, or positive alternative actions identified?

Does the PA or Task have a confirmation process that ensure corective action is taken?

Criterion 3: Effective programs must be implemented by the facility operating procedures and reviewed by the onsite review committee.

CONFIRMATION/DOCUMENTATION DESCRIPTION/BASIS:

Required for completion of Step 6.9.I.3.

Does the PA or Task have a review process?

Does the PA or Task have a change/revision process?

Does the PA or Task have an approval process?

Attachment 10

Source Document List

SYSTEM NUMBER: _____ SYSTEM NAME: _____

ID	TITLE	REVISION NUMBER	TYPE	DATE

Attachment 11

Existing Program Adequacy

SYSTEM NUMBER: _____ GROUP ID: _____ SYSTEM NAME: _____ _____	COMPONENT ID OR SUBCOMPONENT ID _____ _____ _____ _____ _____ _____	

LIST OF APPLICABLE DOCUMENTS (NOTE: IF ADDITIONAL SPACES/LINES ARE NEEDED, USE A SECOND SHEET.)

	PA/TASK ID	NAME	REPLACEMENT FREQUENCY ON TIME / ON CONDITION / NA	PA FREQUENCY VALUE
DISCOVERY			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	
ASSESSMENT/ ANALYSES			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	
CORRECTIVE			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	
CONFIRMATION/ DOCUMENTATION			___ / ___ / ___	
			___ / ___ / ___	
			___ / ___ / ___	

Attachment 11 (cont'd)

CRITERIA REVIEW:

Criterion 1 - Adequate programs must ensure that the SSCs identified as important to license renewal and that contribute to the performance of a required function, or could, if they fail, prevent an SSC important to license renewal from performing its required function will be replaced or refurbished before they are subject to aging unique to license renewal.

1.1 Evaluate the PA or task for adequate technical detail(s)

1.1.1 Is the DISCOVERY PA or task frequency interval less than the shortest ITLR System Function failure time?

— YES — NO — NA

Description/Basis: *(The response to this question is "YES" for a component failure less than the "Discovery PA or Task" if an identified component failure is not an ITLR System Function failure. An example of an acceptable basis would be: "The component failure disabled one channel of the multi-channeled system but did not prevent the multi-channel system from performing its ITLR System Function.")*

1.1.2 Does the PA or task demonstrate historically that it is adequate in maintaining the important function(s) for the identified groupings (i.e. the component failures have not caused ITLR system functional failures prior to replacement)?

— YES — NO — NA

Description/Basis: *(For a program which allows the component to fail before replacement/refurbishment of the component, component historical data does not provide a measure as to the program's adequacy in maintaining ITLR system functions. Therefore, where a component failure is the means for initiating replacement/refurbishment of the component and the component failure does not cause an ITLR System Function failure, the answer would be "NA." Where a component is ITLR and its failure causes an ITLR System Function failure, the answer would be "NO." Whether the component's failure is discovered by the program under evaluation or some other program does not change the response as to whether the program is adequate in maintaining ITLR system functions. For "replacement program potential" components, provide basis contained in previous component evaluation result and review of the component work order history).*

Attachment 11 (cont'd)

1.1.3 Historically, are all maintenance preventable ITLR System functional failures detected by the PA or task?

— YES — NO — NA

Description/Basis: *(A component failure which is discovered by a means other than the program under evaluation is acceptable when the component failure did not cause an ITLR System Function failure and the program under evaluation would have initiated a replacement/refurbishment action for the failed component).*

Criterion 2 - Adequate programs must contain acceptance criteria against which the need for corrective action will be evaluated, and ensure that timely corrective action will be taken when these acceptance criteria are not met.

2.1 For PAs or tasks that do not have a fixed interval of time for replacement:

2.1.1 Does the PA or task have an action or alert value or condition parameter to determine the need for corrective action?

— YES — NO — NA

Action/Condition: *(For "replacement program potential" components address whether the action or alert value is appropriate for the component being evaluated. If not, respond "NO".)*

Attachment 11 (cont'd)

2.1.2 Does the action value or condition provide sufficient indication of degradation to reasonably conclude that there will not be an ITLR system functional failure prior to the next PA or task?

— YES — NO — NA

Basis/Reference:

2.1.3 Does the PA or task ensure that appropriate corrective action is taken?

— YES — NO — NA

Basis/Reference:

2.2 For all PAs or tasks:

2.2.1 Does the corrective action receive proper work prioritization, scheduling and completion on schedule, or are positive alternative actions identified?

— YES — NO — NA

Basis/Reference:

2.2.2 Does the PA or task have a confirmation process that ensures corrective action is taken?

— YES — NO — NA

Basis/Reference:

Attachment 11 (cont'd)

Criterion 3[3] - Adequate programs must be implemented by the facility operating procedures and reviewed by the onsite review committee.

3.1 Evaluate the implementation and review process of the PA or task.

NOTE:

If the PA or task is covered by one of the following site procedures, then answers to 3.1.1, 3.1.2, and 3.1.3 are YES.

CCI-100 covers implementation of all CCIs.

PR-1-100 covers implementation of Administration and Tech. Spec. related programs.

PR-1-101 covers implementation of PMs, ETPs, FTs, PTPs, STPs.

3.1.1 Does the PA or task have a review process?

— YES — NO — NA

Basis/Reference:

3.1.2 Does the PA or task have a change/revision process?

— YES — NO — NA

Basis/Reference:

3.1.3 Does the PA or task have an approval process?

— YES — NO — NA

Basis/Reference:

[3] These items will apply to upper level BG&E procedures that develop, implement, and control lower level PA(s) and tasks.

Program/Activity (PA) Modifications

SYSTEM NUMBER: _____ SYSTEM NAME: _____

PA/TASK OR GROUP ID: _____

DOCUMENT/ SUBTASK	PRESENT DESCRIPTION	NEW/REVISED CORRECTIVE ACTION/RECOMMENDATION

Attachment 13

Independent Technical Review Procedure

Independent Technical Review. The Evaluator and Verifier will perform the following steps to provide the requisite independent technical review for the Component Aging Evaluation.

> CAUTION:
>
> The Verifier and Evaluator cannot be the same individual.

A. **Work Product Preparation**

1. Upon completion of the evaluation, the Evaluator will assemble the completed package and attach an Attachment 14.
2. The Evaluator will fill in the top section and sign and date the Attachment 14.
3. The Evaluator will present the package to the designated verifier.

B. **Work Product Review**. When directed by this Procedure, the Verifier shall review the work products generated in each section as follows.

1. **FOLLOW** the steps presented in the respective sections of this Procedure.
2. **EITHER CONFIRM** that the Evaluator's results are accurate **OR CHALLENGE** what the Evaluator has recorded.
   a. **ASSURE** that the steps of the procedure were implemented correctly
   b. **ASSURE** that the information reviewed is accurate
   c. **ASSURE** that the level of detail is satisfactory.

C. **Comments and Comment Resolution**. The Verifier or Evaluator as specified shall perform the following steps.

1. The Verifier shall **PROVIDE** any comments to the Evaluator in writing on the Independent Technical Review Record (Attachment 14).
   a. Identify each comment with a sequential number.
   b. Indicate applicable page, paragraph, section, etc. of document being reviewed.
   c. Indicate with a check in the response not required column if a response will not be required by the evaluator.
   d. Provide a concise description of the specific comment. Provide satisfactory re-wording where appropriate. Use Attachment 15 as continuation sheet(s).
   e. Number all pages (Attachment 14 and 15(s)).
   f. Sign and date Attachment 14 after completion of verification.
2. The Evaluator shall **RESOLVE** all comments in writing on the same form unless the verifier indicated Response Not Required. The Evaluator will re-sign the Attachment 14 indicating concurrence with comments.
3. The Verifier shall **CONCUR** that each comment has been satisfactorily resolved by the Evaluator and so **INDICATE** by signing the Independent Technical Review Form in the Verifier Concurrence block provided.
4. **IF** any comments cannot be satisfactorily resolved between the Evaluator and Verifier, **THEN** the Verifier will **INITIATE** a Technical Problem Report in accordance with reference 3.2.A.

Attachment 14

Device Type:_____	INDEPENDENT TECHNICAL REVIEW RECORD				Page ___ of ___
Document Title:				Document ID:	Date:
Item No.	**Page/Para**	**Resp Not Req'd**	**Comments (Provide rewording, if possible)**	**Comment Accepted**	**Proposed Comment Resolution**
Evaluator:			Date	Evaluator Concurrence:	Date:
Verifier:			Date:	Verifier Concurrence:	Date:

Attachment 15

Device Type_____	INDEPENDENT TECHNICAL REVIEW RECORD CONTINUATION SHEET	Page ___ of ___

Document Title:	Document ID:	Date:

Item No.	Page/Para	Resp Not Req'd	Comments (Provide rewording, if possible)	Comment Accepted	Proposed Comment Resolution

Attachment C

System and Structure Evaluation Results

BALTIMORE GAS AND ELECTRIC

REACTOR COOLANT SYSTEM EVALUATION RESULTS

1.0 EVALUATION

The system level screening of Calvert Cliffs Nuclear Power Plant (CCNPP) systems was completed in accordance with procedure LCM-12 to implement step 54.21(a)(1) of the Integrated Plant Assessment for Aging process. This screening identified the Reactor Coolant System (RCS) as Important to License Renewal (ITLR).

Subsequently, component level screening was conducted using procedure LCM-11 to comply with steps 54.21(a)(1) and (2) of the IPA process. This screening task, which produced the Reactor Coolant System Component Level Screening Results Revision 3, identified 71 device types (2074 components) as Important to License Renewal. The Reactor Coolant System ITLR component screening summary is provided in the first four columns of the Integrated Plant Assessment Results Summary Table (Attachment 1). 6 of the ITLR device types (#HB, FE, FIT, LG, PNL, TK) were not included in the scope of this Reactor Coolant System Evaluation. The reason that these device types were not included is because the evaluation was performed using the Reactor Coolant System Component Level Screening Results Revision 1 which did not include these device types. (See Note 1 to the IPA Results Summary Table.) These 6 device types will be evaluated at a later date and are not included in the Component Evaluation (Section 1.1) or the Component Aging Evaluation (Section 1.2) discussions below.

The purpose of this summary report is to present the results of the Component Evaluation task which implements step 54.21(a)(3) of the IPA process and the Aging Evaluation Task which implements steps 54.21(a)(5) and (6). Note that only 65 of the device types will be discussed below.

1.1 COMPONENT EVALUATION

The Component Evaluation of the Reactor Coolant System was conducted to comply with step 54.21(a)(3) of the IPA process using BG&E procedure "LCM Component Evaluation", LCM-10, Revision 2. The technical justification of the process governed by LCM-10 is provided in the *Integrated Plant Assessment Methodology Volume 2: Component Evaluation* (Section 3.1.1) as required by 54.21(a)(4)(iii).

LCM-10 evaluated the ITLR components by device type and dispositioned them by one of three methods:

(1) Device types which could not be subject to age-related degradation unique to license renewal (ARD-UTLR).

(2) Device types potentially subject to ARD-UTLR.

(3) Device types for which some components fall into (1) above with the remaining components falling into (2).

The results of the Component Evaluation are summarized in the fifth column of the IPA Results Summary Table. 54 of the 65 ITLR device types (annotated by Method (1) in the results table) were dispositioned per method (1) above. The basis for this determination was an assessment that plant maintenance practices are adequate to ensure that these components would be replaced or refurbished before they would be subject to age related degradation which would be different in character or magnitude during an extended license period.

7 of the 65 device types were dispositioned per method (2) described above, with the remaining 4 device types dispositioned per method (3) above.

Of the 11 device types containing components potentially subject to ARD-UTLR (i.e. Methods (2) and (3)), the entire component was evaluated in the Aging Evaluation task for 8 of the device types (annotated as Method (2) or Method (3) in the results table). For the 3 remaining device types (annotated as Method (2a) or Method (3a) in the results table) a determination was made that certain subcomponents could not be subject to ARD-UTLR. The basis for this determination was an adequacy assessment identical to that performed at the component level except applied to maintenance practices focussed on these subcomponents. The remaining subcomponents for these device types were evaluated in the Component Aging Evaluation task.

1.2 COMPONENT AGING EVALUATION

The aging evaluation of the Reactor Coolant System ITLR components was completed to comply with steps 54.21(a)(5) and (6) of the IPA process using BG&E procedure "LCM Component Aging Evaluation," LCM-16, Revision 1. This procedure evaluated the 11 ITLR device types identified as potentially subject to ARD-UTLR. The evaluation accomplished the following:

(1) Identified specific groups of sub-components which are governed by plant maintenance practices which ensure that the subcomponents are replaced or refurbished when unsatisfactory performance is detected. These programs were then fed back into the Component Evaluation task for a program adequacy assessment. The results of this assessment are described in Section 1.1 above. These subcomponents were not evaluated further in the aging evaluation task.

(2) Identified PLAUSIBLE age-related degradation mechanisms (ARDMs) for each group of components or sub-components.

(3) For ARDMs determined to be PLAUSIBLE for a given group of components, evaluated whether the ARDM is unique to license renewal (UTLR).

(4) Evaluated effectiveness of existing programs against criteria derived from 10CFR54.21(a)(6). Where necessary, developed attributes for program modifications or new programs to effectively manage the age-related degradation identified as plausible and potentially UTLR.

The results and conclusions of the Reactor Coolant System Component Aging Evaluation are summarized in the following section.

2.0 CONCLUSIONS

The Component Aging Evaluation identified a number of plausible age-related degradation mechanisms that could be unique to license renewal. These mechanisms and the effective plant programs to manage the mechanisms are provided in the IPA Results Summary Table. With the exception of the activities discussed in 2.1 through 2.7 below, the programs listed in the table were determined to be effective for management of the ARD-UTLR.

Additionally, a determination was made for the activities discussed in sections 2.1 through 2.7 that, if implemented, the resulting modified or new programs would be effective aging management programs. These activities are currently being evaluated for implementation.

2.1 THERMAL EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL

Thermal embrittlement of cast austenitic stainless steel (CASS) can occur if the delta ferrite content is greater than 20% and the normal operating temperature is 500 ^{O}F or greater. Several subcomponents, including piping safe ends, some valve bodies and some Motor Operated Valve discs were identified as potentially susceptible to thermal embrittlement.

Thermal embrittlement can be managed with the implementation of a new program to evaluate the cast austenitic stainless steel (CASS) subcomponents to determine if any have a delta ferrite content which is greater than 20%. For those subcomponents which are found to have this delta ferrite content, replacement will be considered for subcomponents such as valve bodies and discs. For those safe ends determined to be susceptible to CASS, a new program would include criteria for periodic inspections.

2.2 PASSIVE COMPONENTS (SUB-COMPONENTS) INCLUDING VALVES, PIPING, PRESSURIZERS, REACTOR COOLANT PUMPS AND STEAM GENERATORS

Pressure boundary (PB) components and subcomponents are potentially susceptible to various types of corrosion and stress relaxation of bolting. The types of corrosion include stress corrosion cracking (SCC), erosion, general corrosion, erosion/corrosion, intergranular corrosion and pitting. Components and subcomponents are potentially susceptible to these types of corrosion depending on their materials of composition and their environment.

Stress relaxation and exterior corrosion for many of these components can be managed by formalizing the Boric Acid Corrosion Inspection Program. Corrosion of other components can be managed by modifications to existing inspection programs by adding these components to the list of components to be inspected.

Interior corrosion of steam generators (S/Gs) can be managed by modifications to the BG&E Class 1&2 ISI Program by including those sections of the EPRI NDE guidelines not presently included in the program, and to implement inspections and evaluations for the Inconel nozzles in the primary head, divider plate supports and covers and the tubesheet hemispherical head and weld.

Interior corrosion of the reactor coolant pumps (RCPs) can be effectively managed with the addition of inspections of the impeller and suction deflector to the existing procedure for driver mount and cover/rotating assembly removal.

2.3 PASSIVE COMPONENTS (SUB-COMPONENTS) - RCP HEAT EXCHANGERS

The design for these Heat Exchangers (HXs) is a tube in tube configuration. These HXs serve both as PB and heat removal from the seal water. Wear was identified as ARD-UTLR for these HXs. The presence of wear could not be ruled out, although it was not considered likely to effect the HXs. Alternatives for managing the wear include a one time inspection to determine if wear is in fact occurring, further analysis or a new ultrasonic test inspection program to assess tube wall thickness.

2.4 CORROSION OF PRESSURIZER THERMAL SLEEVES

Thermal sleeves are not part of the system pressure boundary, but do provide protection from thermal shock for pressure boundary components. The pressurizer thermal sleeves are potentially susceptible to SCC and intergranular SCC. These potential ARD-UTLR can be effectively managed by initiating a new inspection program.

2.5 ACTIVE COMPONENTS (SUB-COMPONENTS) - CHECK VALVES

Check valves serve as both PB components and to prevent the reverse flow of fluids. The RCS check valves are potentially susceptible to wear. Wear of the RCP controlled bleed-off flow check valves can be effectively managed by a new program choosing one of three options. These options are 1) replace the valves with a like design at a fixed interval, 2) replace these valves with a design than can be monitored for wear, 3) replace the controlled bleed-off system with a system that includes redundant components whose failure would not cause a shutdown.

2.6 WEAR OF CONTROL VALVES AND MOVS

Control valves (CVs) and MOVs serve passively as PB components and are required to be able to change disc position as operating conditions dictate. CV and MOV discs and seats are potentially susceptible to wear.

Wear of the CVs can be effectively managed by modifying BG&Es' procedure "Pressurizer Spray Valve Inspection and Repair" to establish a fixed time interval by which this procedure will be performed. Wear of the MOV seats and discs can be effectively managed by a new program to inspect these subcomponents.

2.7 MECHANICAL WEAR OF THE REACTOR COOLANT PUMPS

The RCPs serve as passive PB components and actively as the source for forced coolant circulation through the primary loop. The RCPs are potentially susceptible to mechanical wear. This mechanical wear can effectively be managed with the modification of the Rotating Machinery Condition Monitoring Program to include improved trending and the addition of two new programs. These new programs include periodic inspections for the pump internals and RCS flow monitoring for indications of pump wear.

Integrated Plant Assessment Results Summary
For the Reactor Coolant System

Device Type	# ITLR	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
#CC (Piping-Stainless Steel 1500# at 1125°F)	107 (103)	8	LR064-17,24	16 Method (3)	*Corrosion *Stress Corrosion Cracking (SCC) *Thermal Embrittlement *Stress Relaxation of Bolting *Corrosion & IGSCC/SCC of Bolting *Intergranular Stress Corrosion Cracking (IGSCC) *Fatigue	*ASME Section XI ISI Program *Modified Boric Acid Corrosion Inspection Program *New Program for Inspection of Thermal Sleeves *New Program for Material Evaluation of CASS Safe Ends *BG&E Fatigue Monitoring Program
#GC (Piping-Stainless Steel 300# at 1125°F)	28	2	LR064-17	0 Method (2)	*Fatigue *Corrosion & IGSCC/SCC of Bolting *Stress Relaxation of Bolting	*BG&E Fatigue Monitoring Program *Modified Boric Acid Corrosion Inspection Program *ASME Section XI ISI Program
#HB (Piping-Carbon Steel 150# at 500 °F)	12 (0)	0	LR064-22	0	N/A	N/A
#HC (Piping-Stainless Steel 150# at 500 °F)	1 (2)	24	LR064-17	0 Method (2)	*Fatigue	*BG&E Fatigue Monitoring Program
AE (Analyzer Element)	4	0	LR064-03,15	4 Method (1)	N/A	N/A
AI (Analyzer Indicator)	4	0	LR064-03,15	4 Method (1)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
BKR (Circuit Breaker)	24 (16)	4	LR064-16,29	16 Method (1)	N/A	N/A
CKV (Check Valve)	18 (10)	2	LR064-17,22, 24	0 Method (2)	*Fatigue *Wear	*BG&E Fatigue Monitoring Program *New Program for Inspection and/or Repalcement of RCP Bleedoff CKVs
COIL (Electric Coil)	8 (52)	9	LR064-16	52 Method (1)	N/A	N/A
CV (Control Valve)	4	4	LR064-17,20	0 Method (2)	*Fatigue *SCC *Thermal Embrittlement *Stress Relaxation *Wear *Erosion	*BG&E Fatigue Monitoring Program *Modified Boric Acid Corrosion Inspection Program *Modified VALVE-4 Program *New Program for Thermal Embrittlement
CV OP (Control Valve Operator)	4	4	LR064-20	4 Method (1)	N/A	N/A
E/I (Voltage/Current Device)	2	8	LR064-14	2 Method (1)	N/A	N/A
FE (Flow Element)	8 (0)	0	LR064-24	0	N/A	N/A
FIT (Flow Indicator Transmitter)	8 (0)	0	LR064-24	0	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
FU (Fuse)	86 (92)	66	LR064-02,15, 16,24	92 Method (1)	N/A	N/A
HIC (Hand Indicator Controller)	2	0	LR064-20	2 Method (1)	N/A	N/A
HS (Hand Switch)	60 (92)	32	LR064-02,09, 10,12,15,20, 23,24,25,27	92 Method (1)	N/A	N/A
HV (Hand Valve)	577 (559)	246	LR064-17,22, 24,26,28	35 Method (3a)	*Fatigue *Thermal Embrittlement *Corrosion *SCC/IGSCC *Wear *Stress Relaxation	*BG&E Fatigue Monitoring Program *Modified Root Vlave Inspection Programs *Modified RCS Leak Test Programs *New Program to Determine Delta Ferrite in CASS HVs *New Program to Replace HVs with Delte Ferrite Greater than 20%
HX (Heat Exchanger)	12	0	LR064-08,17, 24	0 Method (2)	*SCC *Primary Water SCC *Mechanical Wear *Uniform Attack/General Corrosion *Wear *Stress Relaxation *Intergranular Corrosion *Fatigue *Pitting *Denting *Erosion/Erosion-Corrosion	*BG&E Class 1&2 ISI Programs *Modified Boric Acid Corrosion Inspection Program *Tube Plug Replacement Program *Modified Primary & Secondary Closure Removal & Installation Procedures *Modified EPRI PWR Steam Generator Examination Guidelines *BG&E Fatigue Monitoring Program *New Program to Inspect for Wear of RCP HXs

Device Type	# ITLR	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
I/I (Current/Current Device)	34	1	LR064-01,02, 03,04,06,15	34 Method (1)	N/A	N/A
I/P (Current/Pneumatic Device)	4	0	LR064-20	4 Method (1)	N/A	N/A
II (Ammeter)	4 (12)	0	LR064-02,15	12 Method (1)	N/A	N/A
JL (Power Lamp Indicator)	45 (74)	36	LR064-02,15, 16	74 Method (1)	N/A	N/A
LA (Level Alarm)	16 (24)	16	LR064-24	24 Method (1)	N/A	N/A
LC (Level Controller)	4 (8)	4	LR064-02	8 Method (1)	N/A	N/A
LG (Level Gage)	4 (0)	1	LR064-22	0	N/A	N/A
LI (Level Indicator)	14 (12)	4	LR064-01,02, 11,15,23,24	12 Method (1)	N/A	N/A
LIC (Level Indicating Controller)	4	0	LR064-02,23, 24	4 Method (1)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
LR (Level Relay)	6 (4)	3	LR064-11,15, 23	4 Method (1)	N/A	N/A
LT (Level Transmitter)	24	4	LR064-01,02, 15,17,18,23, 24	24 Method (1)	N/A	N/A
LY (Level Relay)	6	9	LR064-02,23, 24	6 Method (1)	N/A	N/A
M (480V Motor fed from MCC)	8	1	LR064-20,24	8 Method (1)	N/A	N/A
M/P (Microprocessor)	4	0	LR064-11,15	4 Method (1)	N/A	N/A
MD (125/250 VDC Motor)	4 (24)	0	LR064-16	24 Method (1)	N/A	N/A
MH (13KV Motor/Machine)	8	0	LR064-07,24	8 Method (1)	N/A	N/A
MOV (Motor Operated Valve)	6 (4)	0	LR064-12,17, 25,27	0 Method (2a)	*Fatigue *SCC *Thermal Embrittlement *Stress Relaxation *Wear	*AG&E Fatigue Monitoring Program *Modified Boric Acid Corrosion Inspection Program *New Program to Inspect for Wear of Discs and Stems
MOV OP (Motor Operated Valve Operator)	6 (4)	0	LR064-12,18, 25	4 Method (1)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
NB (480 V Local Control Station)	4	1	LR064-29	4 Method (1)	N/A	N/A
PA (Pressure Alarm)	4	0	LR064-23	4 Method (1)	N/A	N/A
PC (Fressure Controller)	4	0	LR064-23	4 Method (1)	N/A	N/A
PDT (Fressure Differential Transmitter)	26	0	LR064-13,17	26 Method (1)	N/A	N/A
PI (Fressure Indicator)	8	19	LR064-02,03, 14,15,17,23	8 Method (1)	N/A	N/A
PIA (Fressure Indicator Alarm)	2	18	LR064-17	2 Method (1)	N/A	N/A
PIC (Fressure Indicator Controller)	8 (4)	0	LR064-14,23	4 Method (1)	N/A	N/A
PNL (Fanel)	2 (0)	5	LR064-23,24	0	N/A	N/A
PR (Fressure Recorder)	4	0	LR064-02,03, 15,23	4 Method (1)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
FT (Pressure Transmitter)	20	23	LR064-02,03, 05,06,14,15, 17,18,23	20 Method (1)	N/A	N/A
PUMP (Pump/Driver Assembly)	16	0	LR064-07,17, 24	8 Method (3a)	*Fatigue *Thermal Embrittlement *SCC *Stress Relaxation *Erosion *Corrosion *Mechanical Wear	*Modified BG&E Fatigue Monitoring Program *ASME Section XI ISI Program *Modified Seal Inspection to Include Impeller and Suction Deflector *Modified Rotating Machinery Condition Monitoring Program *New Programs for Periodic Inspections & Flow Monitoring *Modified Boric Acid Corrosion Inspection Program
PY (Pressure Relay)	12	28	LR064-02,03, 14,15,23	12 Method (1)	N/A	N/A
PZV (Pressure Vessel)	4[2] (2)	0	LR064-10,12, 17,19,28	0 Method (2)	*Corrosion *SCC *Erosion *Fatigue *Stress Relaxation of Bolting *Thermal Embrittlement *Wear of Gaskets *IGSCC *Erosion-Corrosion	*ASME Section XI ISI Program *Modified Boric Acid Corrosion Inspection Program *New Program for PZR Spray Head Inspection *New Program For Material Evaluation of CASS Safe Ends *New Program for Thermal Sleeve Inspection *BG&E Fatigue Monitoring Program
RI (Radiation Indicator)	90[3] (87)	0	LR064-09,15 18	87 Method (1)	N/A	N/A

Device Type	# ITLR	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
RV (Relief Valve)	8	2	LR064-12,17, 27	4 Method (3)	*Fatigue *SCC *Wear *Stress Relaxation *Thermal Embrittlement *Erosion	*BG&E Fatigue Monitoring Program *Modified Boric Acid Corrosion Inspection Program *RCS Leakage Evaluation Program *New Program for Determination of Delta Ferrite Content and Possible Replacement of RV Cages
RY (Relay)	78 (92)	70	LR064-02,14, 15,16,24,25	92 Method (1)	N/A	N/A
SV (Solenoid Valve)	8	6	LR064-10,17, 18,27	6 Method (1)	N/A	N/A
TE (Temperature Element)	92	114	LR064-03,04, 06,11,15,17, 18,23	92 Method (1)	N/A	N/A
TI (Temperature Indicator)	40 (42)	4	LR064-03,04, 06,09,15,24	42 Method (1)	N/A	N/A
TIA (Temperature Indicator Alarm)	16 (18)	19	LR064-24	18 Method (1)	N/A	N/A
TK (Tank)	4 (0)	2	LR064-22	0	N/A	N/A
TP (Temperature Test Point)	4	0	LR064-11,15, 18	4 Method (1)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
TR (Temperature Recorder)	12	0	LR064-04,06, 09,15	12 Method (1)	N/A	N/A
TT (Temperature Transmitter)	90	0	LR064-09,15	90 Method (1)	N/A	N/A
TY (Temperature Relay)	16 (20)	8	LR064-09,15	20 Method (1)	N/A	N/A
U (Heater)	144 (239)	105	LR064-02,29	239 Method (1)	N/A	N/A
VE (Vibration Element)	8	72	LR064-12,15, 18,21,27	8 Method (1)	N/A	N/A
VI (Vibration Indicator)	16	10	LR064-12,15, 21,27	16 Method (1)	N/A	N/A
VIA (Vibration Indicator Alarm)	2	1	LR064-12,15 21,27	2 Method (1)	N/A	N/A
VT (Vibration Transmitter)	8	57	LR064-12,15, 18,21,27	8 Method (1)	N/A	N/A
XL (Miscellaneous Indicating Lamp)	32	0	LR064-02,15, 24	32 Method (1)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
YX (Power Supply)	40 (43)	17	LR064-01,02, 03,05,06,12, 13,14,15,24	43 Method (1)	N/A	N/A
ZL (Position Indicating Lamp)	44 (80)	30	LR064-02,10, 12,15,20,25, 27	80 Method (1)	N/A	N/A
ZS (Position Switch)	37 (32)	4	LR064-10,12, 15,16,18,20, 25,27	32 Method (1)	N/A	N/A

Notes

1 The numbers in parenthesis are the number of components that were determined to be ITLR in the Reactor Coolant System Component Level Screening Results, Revision 1,. The numbers without parenthesis reflect the results of the Reactor Coolant System Component Level Screening Results, Revision 3. Those device types with only one number were the same for both revisions of the Reactor Coolant System Component Level Screening Results.Revision 1 of the Reactor Coolant System Component Level Screening Results were used to perform the component evaluations. The delta between Revisions 1 and 3 of the Reactor Coolant System Component Level Screening Results includes 472 components representing 18 device types which were evaluated but are no longer identified as ITLR for the RCS. Additionally, 244 components representing 23 device types which are now identified as ITLR in the RCS require a component evaluation. These later components were not identified during the Revision 1 component level screening.

2 The reactor vessels for both units were determined to be ITLR and are carried with the Reactor Coolant System, however they were not evaluated with the RCS.

3 The components RI (Radiation Indicators) were evaluated using the device type NI (Nuclear Indicator).

ITLR Functions for the Reactor Coolant System

LR064-01	To Provide Manual Control of Reactor Coolant System Pressure and Pressurizer Level Via Charging Pumps During DBEs
LR064-02	To Control Reactor Coolant System Pressure by Regulating Water Temperature in the Pressurizer
LR064-03	To Provide Indication of Degrees of Subcooling During DBEs
LR064-04	To Provide Wide Range Loop Temperature Signals via Resistance Temperature Detector Circuits
LR064-05	To Provide Pressurizer Pressure Signals via Safety Measurement Channels
LR064-06	To Provide Thermal Margin/Low Pressure Signals to the Reactor Protective System for TM/LP Trip
LR064-07	To Provide Coastdown Flow on Interruption of Power to Reactor Coolant Pumps
LR064-08	To Provide Reactor Core Decay Heat Removal via Natural Circulation
LR064-09	To Provide Indication of Natural Circulation Flow via Core Exit Thermocouples
LR064-10	To Vent the Reactor Coolant System When Natural Circulation Flow has been Disrupted or Blocked by Accumulation of Non-Condensable Gases
LR064-11	To Provide Reactor Vessel Coolant Inventory Level Indication
LR064-12	To Provide Protection form Overpressure in the Reactor Coolant System
LR064-13	To Provide Differential Pressure Signals to the Reactor Protective System for Low Flow Trip
LR064-14	To Provide Valve Operation Logic Signals to Support Safety Injection System Functions
LR064-15	To Provide Information Used to Assess the Environs and Plant Conditions During and Following An Accident
LR064-16	To Maintain Electrical Continuity and/or Provide Protection of the Electrical System
LR064-17	To Maintain the Pressure Boundary of the System (Liquid and/or Gas)
LR064-18	To Maintain Functionality of Electrical Components as Addressed by the EQ Program
LR064-19	To Maintain Fracture Toughness of the Vessel
LR064-20	To Control RCS Pressure During Recovery from a Significant Overcooling Event
LR064-21	To Detect Leakage from the Primary System Following Loss of AC Power
LR064-22	To Provide Lube Oil Collection for the Reactor Coolant Pump Motors Sized to Accommodate the Largest Potential Oil Leak
LR064-23	To Provide Monitoring of Essential Parameters for Ensuring Safe Shutdown in the Event of A Postulated Severe Fire
LR064-24	To Provide Heat Removal form the Reactor Core and Internals During Operational Modes 1, 2, 3, 4 & 5
LR064-25	To Provide Reactor Coolant System Heat Removal by Realignment and Operation of the Shutdown Cooling Flowpath
LR064-26	To Provide Containment Isolation of the Reactor Coolant System During a LOCI
LR064-27	To Provide RCS Isolation to Maintain Inventory Following Loss of AC Power
LR064-28	To Maintain Small Continuous Flow through Pressurizer Spray Lines during Normal Operations
LR064-29	To Control RCS Pressure by Regulating PZR Water Temperature During Shutdown in the Event of a Postulated Severe Fire

SALT WATER COOLING SYSTEM EVALUATION RESULTS

1.0 EVALUATION

The system level screening of Calvert Cliffs Nuclear Power Plant (CCNPP) systems was completed in accordance with procedure LCM-12 to implement step 54.21(a)(1) of the Integrated Plant Assessment for Aging process. This screening identified the Salt Water Cooling System as Important to License Renewal (ITLR).

Subsequently, component level screening of the Salt Water Cooling System was conducted per procedure LCM-11 to comply with steps 54.21(a)(1) and (2) of the IPA process. This screening task identified 39 device types (1410 components) as Important to License Renewal. The Salt Water Cooling System ITLR component screening summary is provided in the first four columns of the Integrated Plant Assessment Results Summary Table (Attachment 1).

The purpose of this summary report is to present the results of the Component Evaluation task which implements step 54.21(a)(3) of the IPA process and the Aging Evaluation task which implements steps 54.21(a)(5) and (6).

1.1 COMPONENT EVALUATION

The Component Evaluation of the Salt Water Cooling System was conducted to comply with step 54.21(a)(3) of the IPA process using BG&E procedure "LCM Component Evaluation", LCM-10, Revision 2. The technical justification of the process governed by LCM-10 is provided in the Integrated Plant Assessment Methodology Volume 2: Component Evaluation (Section 3.1.1) as required by 54.21(a)(4)(iii).

LCM-10 evaluated the ITLR components by device type and dispositioned them by one of three methods:

(1) Device types which could not be subject to age-related degradation unique to license renewal (ARD-UTLR).

(2) Device types potentially subject to ARD-UTLR.

(3) Device types for which some components fall into (1) above with the remaining components falling into (2).

The results of the Component Evaluation are summarized in the fifth column of the IPA Results Summary Table. 17 of the 39 ITLR device types were dispositioned per Method (1) above. The basis for the Method (1) determination for 15 of these device types (annotated by Method (1a) in the results table) was an assessment that plant maintenance practices are adequate to ensure that all components in these device types would be replaced or refurbished before they would be subject to age-related degradation which would be different in character or magnitude during an extended license period. The basis for the remaining 2 device types dispositioned using Method (1) (annotated by Method (1b) in the results table) was that all components of these device types in the Salt Water Cooling System are being replaced as part of a planned system hardware modification.

Of the 22 remaining device types which contain some components potentially subject to ARD-UTLR, 18 were dispositioned per Method (2) above, and 4 per Method (3). The 4 device types fell into method (3) because the maintenance strategy for the components in the device type varied. For example, some solenoid valves in the system are replaced

at periodic intervals under the Environmental Qualification Program and others, which are located in a mild environment, are not.

Of the 22 device types containing some components potentially subject to ARD-UTLR (i.e. Methods (2) and (3)), the entire component was evaluated in the Aging Evaluation task for 13 of the device types (annotated as Method (2) or Method (3) in the results table). For the remaining 9 device types (annotated as Method (2a) or Method (3a) in the results table), a determination was made that certain subcomponents could not be subject to ARD-UTLR. The basis for this determination was an adequacy assessment identical to that performed at the component level except applied to maintenance practices focussed on these subcomponents. The remaining subcomponents for these device types were evaluated in the Component Aging Evaluation task.

1.2 COMPONENT AGING EVALUATION

The aging evaluation of the Salt Water Cooling System ITLR components was completed to comply with steps 54.21(a)(5) and (6) of the IPA process using BG&E procedure "LCM Component Aging Evaluation," LCM-16, Revision 1. This procedure evaluated the 22 ITLR device types containing components potentially subject to ARD-UTLR. The evaluation accomplished the following:

(1) Identified specific groups of sub-components which are governed by plant maintenance practices which ensure that the subcomponents are replaced or refurbished when unsatisfactory performance is detected. These programs were then fed back into the Component Evaluation task for a program adequacy assessment. The results of this assessment are described in Section 1.1. These sub-components were not evaluated further in the Aging Evaluation task.

(2) Identified PLAUSIBLE age-related degradation mechanisms (ARDMs) for each group of components or sub-components.

(3) Evaluated whether the ARDM is unique to license renewal (UTLR), for ARDMs determined to be PLAUSIBLE for a given group of components.

(4) Evaluated effectiveness of existing programs against criteria derived from 10CFR54.21(a)(6). Where necessary, developed attributes for program modifications or new programs to effectively manage the age-related degradation identified as plausible and potentially UTLR.

The results and conclusions of the Salt Water Cooling System Component Aging Evaluation are summarized in the following section.

2.0 CONCLUSIONS

The Component Aging Evaluation identified a number of plausible age-related degradation mechanisms that could be unique to license renewal. These mechanisms and the effective plant programs to manage the mechanisms are provided in the IPA Results Summary Table. With the exception of the activities discussed in paragraph 2.1 and 2.2 below, the programs listed in the table were determined to be effective for management of the ARD-UTLR.

Additionally a determination was made for the activities discussed in 2.1 and 2.2 that, if implemented, the resulting new or modified programs would be effective aging management programs. These activities are currently being evaluated for implementation.

Two major categories of components were evaluated with respect to ARDMs. The largest category and the main focus of this evaluation was the salt water system passive components. The other was the passive compressed air components that support the operation of the salt water cooling system and which are included in the Salt Water Cooling System boundary.

2.1 PASSIVE SALT WATER COOLING COMPONENTS (SUB-COMPONENTS) - PRESSURE BOUNDARY

Pressure boundary components and sub-components are subject to a variety of uniform and localized corrosion due to the aggressive salt water environment and susceptible material of construction. Carbon steel and cast iron in particular are susceptible to these age-related degradation mechanisms. These mechanisms can be effectively managed, however, if physical separation of the environment and the susceptible material is accomplished with the use of liners and coatings and periodic inspections are conducted to detect, analyze, and correct degradation if it occurs. For large bore piping and associated components, visual inspections of the internal surfaces of the components and verification of liner integrity are performed to detect any degradation. For small bore piping and associated components, walkdowns and visual inspections of the external surfaces of the components are performed. Any degradation detected is documented and appropriate corrective action is completed.

2.2 PASSIVE COMPRESSED AIR SYSTEM COMPONENTS (SUB-COMPONENTS) - PRESSURE BOUNDARY

Several components which direct compressed air to Salt Water Cooling System components are contained within the boundary of the Salt Water Cooling System. It has been determined in the Compressed Air System Evaluation that the best means of managing the plausible ARDMs in this system is to prevent the conditions which cause or exacerbate the mechanisms by maintaining an aggressive air quality control program. This conclusion also applies to the compressed air components within the Salt Water Cooling System. The current CCNPP air quality control program verifies proper filter and dryer operation and checks air quality on a 24 week basis. Some enhancements to the existing programs have been recommended. A description of the age management program for the CAS system can be found in the Compressed Air System Evaluation Results.

INTEGRATED PLANT ASSESSMENT RESULTS SUMMARY FOR THE SALT WATER COOLING SYSTEM

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
#LC (Piping - Cement Mortar Lined Cast Iron, 50# at 95°F	17 (20)	0	LR012-04	0 Method (2)	* Crevice Corrosion * Erosion Corrosion * Galvanic Corrosion * General Corrosion * MIC * Particulate Wear Erosion * Pitting * Selective Leaching	* Internal Visual Inspection * Liner Integrity Verification
#LJ (Piping - Rubber Lined Carbon Steel, 50# at 95°F	72 (72)	4	LR012-04	1[3] Method (2)	* Cavitation Erosion * Crevice Corrosion * Erosion Corrosion * Galvanic Corrosion * General Corrosion * MIC * Particulate Wear Erosion * Pitting * Rubber Degradation	* Internal Visual Inspection * Liner Integrity Verification
#SC (Piping - Synthetic Lined Carbon Steel, 50# at 95°F	36	15	LR012-04	0 Method (2)	* Cavitation Erosion * Crevice Corrosion * Erosion Corrosion * Galvanic Corrosion * General Corrosion * MIC * Particulate Wear Erosion * Pitting	* System External Walkdown and Inspection * Abnormal Condition Verification
ACC (Accumulator)	44	4	LR012-04 LR012-01	16[3] Method (2)	* Crevice Corrosion * General Corrosion * MIC * Pitting	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check & System Blowdown * Operator Logs Filter Checks

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
BS (Basket Strainer)	4	3	LR012-04	4 Method (1a)	N/A	N/A
CKV (Check Valve)	18	62	LR012-04	6[3] Method (2a)	* Cavitation Erosion * Crevice Corrosion * Erosion Corrosion * Galvanic Corrosion * General Corrosion * Particulate Wear Erosion * Pitting	* Internal Visual Inspection * Liner Integrity Verification
COIL (Electric Coil)	16	0	LR012-06	16 Method (1a)	N/A	N/A
CV (Control Valve w/o Operator)	44	0	LR012-01 LR012-04	30 Method (3a)	* Cavitation Erosion * Crevice Corrosion * Erosion Corrosion * Galvanic Corrosion * MIC * Particulate Wear Erosion * Pitting * Rubber Degradation	* System External Walkdown and Inspection * Abnormal Condition Verification
CVOP (Control Valve Operator)	44	0	LR012-01 LR012-04	0 Method (2)	* Crevice Corrosion * Fouling * General Corrosion * MIC * Pitting	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Chk & System Blowdown * Operator Logs Filter Checks
FO (Flow Orifice)	2	2	LR012-04	2[3] Method (1b)	N/A	N/A
FP (Flow Test Point)	12	0	LR012-04	0 Method (2)	N/A	N/A
FU (Fuse)	42	5	LR012-06	42 Method (1a)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
HS (Handswitch)	52	2	LR012-01	48 4[3] Method (1a)	N/A	N/A
HV (Hand Valve)	384 (399)	396	LR012-04 LR012-05	20 42[3] Method (3a)	* Crevice Corrosion * Erosion Corrosion * Fouling * Galvanic Corrosion * General Corrosion * MIC * Particulate Wear Erosion * Pitting * Selective Leaching * Wear * Rubber Degredation	Salt Water * System External Walkdown and Inspection * Abnormal Condition Verification --- Compressed Air * Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Chk & System Blowdown * Operator Logs Filter Checks
HX (Heat Exchanger)	12	0	LR012-04 LR011-01 LR011-10 LR015-02 LR015-11 LR032-03	0 Method (2a)	* Galvanic Corrosion * Selective Leaching	* Internal Visual Inspection * Coating Integrity Verification
I/P (Current/Pneumatic Device)	8	0	LR012-04	0 Method (2)	None	N/A
II (Ammeter)	8	0	LR012-01 LR012-02	8 Method (1a)	N/A	N/A
JL (Power Lamp Indicator)	23 (24)	0	LR012-01 LR012-06	16 8[3] Method (1a)	N/A	N/A
LY (Level Relay)	8	0	LR012-06	8 Method (1a)	N/A	N/A

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
MA (4 kV Motor)	6	0	LR012-01	6 Method (1a)	N/A	N/A
MD (125/250 VDC Motor)	0 (8)	0	LR012-01	8 Method (1a)	N/A	N/A
MOV (Motor Operated Valve)	4	0	LR012-04	0 Method (2a)	* Crevice Corrosion * General Corrosion * Pitting * Selective Leaching	* System External Walkdown and Inspection * Abnormal Condition Verification
NA (4 kV Local Control Station)	4	0	LR012-06	4 Method (1a)	N/A	N/A
PDI (Pressure Differential Indicator)	4	0	LR012-04	4[3] Method (1b)	N/A	N/A
PDIS (Pressure Differential Indicator Switch)	4	2	LR012-04	0 Method (2)	* Crevice Corrosion * Pitting * Selective Leaching	* System External Walkdown and Inspection * Abnormal Condition Verification
PI (Pressure Indicator)	69	30	LR012-01 LR012-02 LR012-04	4 15[3] Method (3)	* Crevice Corrosion * Pitting	* System External Walkdown and Inspection * Abnormal Condition Verification * Selective Leaching
PP (Pressure Test Point)	2	2	LR012-04	0 Method (2)	* Crevice Corrosion * Pitting * Selective Leaching	* System External Walkdown and Inspection * Abnormal Condition Verification
PS (Pressure Switch)	8	12	LR012-01 LR012-03 LR012-04	0 Method (2a)	* Crevice Corrosion * Pitting	* System External Walkdown and Inspection * Abnormal Condition Verification

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
PT (Pressure Transmitter)	12	0	LR012-01 LR012-02 LR012-04	0 Method (2a)	* Crevice Corrosion * Intergranular Attack * Pitting * Stress Corrosion Cracking	* System External Walkdown and Inspection * Abnormal Condition Verification
PUMP (Pump/Driver Assembly)	6	8	LR012-01 LR012-04	0 Method (2a)	* Cavitation Erosion * Crevice Corrosion * Erosion Corrosion * General Corrosion * MIC * Particulate Wear Erosion * Pitting * Selective Leaching	* Internal Visual Inspection * Coating Integrity Verification
RV (Relief Valve)	12	39	LR012-04	0 Method (2)	* Crevice Corrosion * Fouling * Pitting * Selective Leaching	* System External Walkdown and Inspection * Abnormal Condition Verification
RY (Relay)	52	3	LR012-01 LR012-06	52 Method (1a)	N/A	N/A
SV (Solenoid Valve)	52	0	LR012-01 LR012-03 LR012-04	32 Method (3)	None	N/A
TC (Temperature Controller)	0 (4)	0	LR012-04 LR032-03	0 Method (2a)	None	N/A
TE (Temperature Element)	30	0	LR012-04	30 Method (1a)	N/A	N/A
TI (Temperature Indicator)	24	11	LR012-04	0 Method (2)	* Crevice Corrosion * Particulate Wear Erosion	* System External Walkdown and Inspection * Abnormal Condition Verification

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
XJ (Expansion Joint)	14	0	LR012-04	14 Method (1a)	N/A	N/A
ZL (Position Indicating Lamp)	128 (128)	1	LR012-01 LR012-02	120 8[3] Method (1a)	N/A	N/A
ZS (Position Switch)	96	0	LR012-01 LR012-02 LR012-03	88 8[3] Method (1a)	N/A	N/A

1. The number in parentheses in this column indicates the number of components which were evaluated in LCM-10 and 16 if these numbers differed from those which screened as ITLR. The primary reason for the differences are that the evaluation input was based on Revision 1 to the screening results. Revision 2 to the screening results incorporated several completed hardware modifications to the Salt Water Cooling System which added or deleted components.

2. ITLR Functions

LR012-01 To provide VA function of supplying cooling water to the CC and SRW heat exchangers and the ECCS pump room air coolers during DBEs.

LR012-02 To provide information used to assess the environs and plant condition during and after an accident. (Emergency salt water discharge valve position indication (VPI), circulating water pump room air cooler salt water inlet/outlet VPI, service water heat exchanger salt water inlet/outlet VPI, component cooling heat exchanger salt water inlet/outlet VPI, ECCS pump room air cooler salt water inlet/outlet VPI, salt water pump motor current, and salt water pumps discharge header pressure.)

LR012-03 To maintain functionality of electrical components as addressed by the EQ program.

LR012-04, 11-10 & 15-11 To maintain the pressure boundary of the system.

LR012-05 To provide ultimate heat sink for SRW/CC systems to ensure safe shutdown in the event of a postulated severe fire.

LR012-06 To maintain electrical continuity and/or provide protection of the electrical system.

LR011-01 To serve as a vital auxiliary to ESFAS by processing signals and as vital auxiliary to EDGS, SFP, and containment coolers by providing cooling water.

LR015-02 To provide VA function for containment spray cooling and HPSI/LPSI cooling.

LR032-03 To provide heating, ventilation and air conditioning and remove potentially radioactive contaminants from the Emergency COre Cooling System Pump Room

3. These components are to be deleted from the ITLR component list because of pending hardware changes or Q List changes..

COMPRESSED AIR SYSTEM EVALUATION RESULTS

1.0 EVALUATION

The system level screening of Calvert Cliffs Nuclear Power Plant (CCNPP) systems was completed in accordance with procedure LCM-12 to implement step 54.21(a)(1) of the Integrated Plant Assessment for Aging process. This screening identified the Compressed Air System as Important to License Renewal (ITLR).

Subsequently, component level screening was conducted per procedure LCM-11 to comply with steps 54.21(a)(1) and (2) of the IPA process. This screening task identified 27 device types (523 components) as Important to License Renewal. The Compressed Air System ITLR component screening summary is provided in the first four columns of the Integrated Plant Assessment Results Summary Table (Attachment 1). Two of the ITLR device types (COIL and MB) were not included in the scope of this Compressed Air System Evaluation, because planned system hardware modifications will result in these device types no longer performing ITLR functions. (See Note 1 to the IPA Results Summary Table.)

The purpose of this summary report is to present the results of the Component Evaluation task which implements step 54.21(a)(3) of the IPA process and the Aging Evaluation task which implements steps 54.21(a)(5) and (6).

1.1 COMPONENT EVALUATION

The Component Evaluation of the Compressed Air System was conducted to comply with step 54.21(a)(3) of the IPA process using BG&E procedure "LCM Component Evaluation", LCM-10, Revision 2. The technical justification of the process governed by LCM-10 is provided in the *Integrated Plant Assessment Methodology Volume 2: Component Evaluation* (Section 3.1.1) as required by 54.21(a)(4)(iii).

LCM-10 evaluated the ITLR components by device type and dispositioned them by one of two methods:

(1) Device types which could not be subject to age-related degradation unique to license renewal (ARD-UTLR).

(2) Device types potentially subject to ARD-UTLR.

The results of the Component Evaluation are summarized in the fifth column of the IPA Results Summary Table. A determination was made for 9 of the 27 ITLR device types (annotated as Method (1a) in the table) that the components in these device types could not be subject to ARD-UTLR. The basis for this determination was an assessment that plant maintenance practices are adequate to ensure that these components would be replaced or refurbished before they would be subject to age related degradation which would be different in character or magnitude during an extended license period.

For 4 of the 27 ITLR device types (annotated by Method (1b) in the table), a determination was made that the components are not subject to ARD-UTLR because all components of these device types in the Compressed Air System are being replaced as part of a planned system hardware modification.

The remaining 12 device types were determined to be potentially subject to ARD-UTLR. For 5 of these device types (annotated by Method (2) in the table), the entire component was evaluated in the Component Aging Evaluation task discussed in the next section. However, for the remaining 7 device types (annotated by Method (2a) in the table), a determination was made that certain subcomponents could not be subject to

ARD-UTLR. The basis for this determination was an adequacy assessment identical to that performed at the component level except applied to maintenance practices focussed on these subcomponents. The remaining subcomponents of these 7 device types were evaluated in the Component Aging Evaluation task.

1.2 COMPONENT AGING EVALUATION

The aging evaluation of the Compressed Air System ITLR components was completed to comply with steps 54.21(a)(5) and (6) of the IPA process using BG&E procedure "LCM Component Aging Evaluation," LCM-16, Revision 1. This procedure evaluated the 12 ITLR device types identified as potentially subject to ARD-UTLR. The evaluation accomplished the following:

(1) Identified specific groups of sub-components which are governed by plant maintenance practices which ensure that the subcomponents are replaced or refurbished when unsatisfactory performance is detected. These programs were then fed back into the Component Evaluation task for a program adequacy assessment. The results of this assessment are described in section 1.1. These subcomponents were not evaluated further in the aging evaluation task.

(2) Identified PLAUSIBLE age-related degradation mechanisms (ARDMs) for each group of components or sub-components.

(3) For ARDMs determined to be PLAUSIBLE for a given group of components, evaluated whether the ARDM is unique to license renewal (UTLR).

(4) Evaluated effectiveness of existing programs against criteria derived from 10CFR54.21(a)(6). Where necessary, developed attributes for program modifications or new programs to effectively manage the age-related degradation identified as plausible and potentially UTLR.

The results and conclusions of the Compressed Air System Component Aging Evaluation are summarized in the following section.

2.0 CONCLUSIONS

The Component Aging Evaluation identified a number of plausible age-related degradation mechanisms that could be unique to license renewal. These mechanisms and the effective plant programs to manage the mechanisms are provided in the IPA Results Summary Table. With the exception of the activities discussed in 2.1 through 2.3 below, the programs listed in the table were determined to be effective for management of the ARD-UTLR.

Additionally, a determination was made for the activities discussed in sections 2.1 through 2.3 that, if implemented, the resulting modified or new programs would be effective aging management programs. These activities are currently being evaluated for implementation.

2.1 PASSIVE COMPONENTS (SUB-COMPONENTS) - PRESSURE BOUNDARY

Pressure boundary components and sub-components are subjected to contamination/sedimentation related degradation as well as a variety of corrosion mechanisms. These mechanisms are plausible because of the potential for introduction of undried and unfiltered air into the system. Carbon steel pressure boundary materials in particular are susceptible to the resulting age-related degradation mechanisms. These mechanisms can be effectively managed, however, if clean dry air is utilized throughout the system. The current Calvert Cliffs air quality program verifies proper filter and dryer operation and checks air quality (dewpoint and particulates) on a 24 weekly basis. The

current program could be made "effective for license renewal" by defining an alert value and a specific corrective action to be taken if the results of air samples show the air quality to be outside prescribed limits. Corrective action would consist of blowing down air receivers, accumulators and low points in the piping.

2.2 ACTIVE COMPONENTS (SUB-COMPONENTS) - CHECK VALVES

Six Compressed Air System check valves do not have "Prevent Reverse Flow" as an ITLR function. Plausible ARDMs were identified which affect the internals of these valves which could hypothetically affect the "allow forward flow" function of the valves. A review of the maintenance history of the check valves revealed no such degradation has caused one of these valves to fail so far. However, to satisfactorily account for the potential for an age-related failure of these valves, a one-time inspection of the internals of the valves could be conducted to determine if any ARDMs have been affecting their ability to allow flow in the forward direction. If this inspection reveals that such degradation is present, the internals of these check valves could be removed without affecting any important system functions. Alternately a time or condition based monitoring program could be developed for the valves.

2.3 ACTIVE COMPONENTS (SUB-COMPONENTS) - PRESSURE CONTROL VALVES

Four pressure control valves were identified as having an ITLR function of regulating air pressure. Plausible age-related degradation mechanisms were identified resulting in the determination that a component-specific performance monitoring/testing program is required to manage the aging of these components.

Integrated Plant Assessment Results Summary
For the Compressed Air System

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
#HB (Piping-Carbon Steel 150# at 500°F)	13	189	LR019-08,09	0 Method (2)	* Contamination/Sedimentation * Crevice Corrosion * General Corrosion * Microbiologically Influenced Corrosion * Pitting	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks
ACC (Accumulator)	18 (12)	4	LR019-02,03, 08,09	4[3] Method (2)	* Contamination/Sedimentation * General Corrosion * Microbiologically Influenced Corrosion * Pitting	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks
CKV (Check Valve)	34 (36)	44	LR019-08,09	6[3] Method (2a)	* Contamination/Sedimentation * Crevice Corrosion * Dynamic Loading * Fatigue * General Corrosion * Microbiologically Influenced Corrosion * Pitting * Wear	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks
COIL (Electric Coil)	12 (0)	0	LR019-10	0	NA	NA
COMP (Compressor)	10 (4)	0	LR019-01,03, 08,09	4[3] Method (1b)	NA	NA
CV (Control Valve)	3 (2)	23	LR019-03,08, 09	0 Method (2a)	* Contamination/Sedimentation * Crevice Corrosion * General Corrosion * Microbiologically Influenced Corrosion * Pitting	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
CVOP (Control Valve Operator)	3 (2)	23	LR019-03,08, 09	0 Method (2a)	* Contamination/Sedimentation	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks
DT (Drain Trap)	4	18	LR019-08	4[3] Method (1b)	NA	NA
FU (Fuse)	12	10	LR019-10	12 Method (1a)	NA	NA
HS (Hand Switch)	30 (18)	13	LR019-01,03, 05,09	18 Method (1a)	NA	NA
HV (Hand Valve)	238 (214)	1333	LR019-05,08, 09	12[3] Method (2a)	* Contamination/Sedimentation * Crevice Corrosion * General Corrosion * Microbiologically Influenced Corrosion * Pitting	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks
JL (Power Lamp Indicator)	24 (16)	4	LR019-01,03, 05,09,10	16 Method (1a)	NA	NA
LS (Level Switch)	4	0	LR019-01,03, 08,09	4[3] Method (1b)	NA	NA
M (480V Motor Fed from MCC)	4	0	LR019-01,03, 09	4[3] Method (1b)	NA	NA
MB (480V Motor)	6 (0)	0	LR019-09	0	NA	NA

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
MOV (Motor Operated Valve)	2	0	LR019-03,05, 08	0 Method (2a)	* Contamination/Sedimentation * Crevice Corrosion * General Corrosion * Microbiologically Influenced Corrosion	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks
MOVOP (Motor Operated Valve Operator)	2	0	LR019-03,05	2 Method (1a)	N/A	N/A
PCV (Pneumatic Control Valve and Operator)	6	28	LR019-02,08	0 Method (2)	* Contamination/Sedimentation * Crevice Corrosion * General Corrosion * Microbiologically Influenced Corrosion * Dynamic Loading * Wear	* Performance Evaluation of Air Filters * Performance Evaluation of Air Dryers * Instrument Air Quality Check and System Blowdown * Operator Logs Filter Checks * Pneumatic Control Valve Functional Test
PI (Pressure Indicator)	10 (4)	78	LR019-08	0 Method (2)	None	NA
PNL (Panel)	2	4	LR019-11	0 Method (2)	None	NA
PS (Pressure Switch) *	8	47	LR019-03,07, 08	0 Method (2a)	None	NA
RV (Relief Valve)	10	42	LR019-08	0 Method (2a)	None	NA
RY (Relay)	20	17	LR019-03,10	20 Method (1a)	NA	NA
SV * (Solenoid Valve)	2	47	LR019-03,07, 08	2 Method (1a)	NA	NA
TS (Temperature Switch)	4	13	LR019-01,03, 08,09	4 Method (1a)	NA	NA

Device Type	# ITLR[1]	# Not ITLR	ITLR Functions[2]	# Could Not Be Subject to ARD-UTLR	Plausible ARDMs	Effective Programs
ZL (Position Indicating Lamp)	36 (32)	4	LR019-01,03, 04,05,06,09	32 Method (1a)	NA	NA
ZS (Position Switch)	8	20	LR019-03,05, 06,07	8 Method (1a)	NA	NA

1 The number in parentheses in this column indicates the number of components which were evaluated in LCM-10 and 16 if these numbers differed from those which screened as ITLR. The primary reasons for the differences are (1) The screening results indicated that the Instrument Air (IA) Compressors, Plant Air (PA) Compressors and related valves and instrumentation are ITLR because of Fire Protection. In certain scenarios, when a postulated fire renders the safety-related Salt Water Air Compressors (SWACs) unavailable, these IA compressors or PA Compressors are relied upon to supply air for safe shutdown of the plant. A third safety-related Salt Water Air Compressors is scheduled for installation under FCR 89-0174, in an area where it would not be affected by the same fire as the other SWACs. Consequently, the IA compressors, PA compressors and related components will not be ITLR for fire protection after that FCR is complete. Therefore, these components were not included in this evaluation. (2) Several check valves were removed from the system during the time frame of the screening and evaluation tasks.

2 ITLR Functions

LR019-01 To provide a vital auxiliary air supply, via Salt Water Air subsystem, for components used to mitigate design basis events.

LR019-02 To provide a vital auxiliary air supply, via Feedwater Air Subsystem, for components used to mitigate design basis events.

LR019-03 To provide a vital auxiliary air supply, via Containment Air Subsystem, for components used to mitigate design basis events.

LR019-04 To provide indication of load shed.

LR019-05 To provide containment isolation during a LOCI.

LR019-06 To provide information used to assess the plant and environs during and following an accident (IA Containment Isolation Valve Position indication)

LR019-07 To maintain the functionality of electrical components as addressed by the EQ program.

LR019-08 To maintain the pressure boundary of the system.

LR019-09 To provide control air to essential loads to ensure safe shutdown in the event of a postulated severe fire.

LR019-10 To maintain electrical continuity and/or provide protection of the electrical system.(1E)

LR019-11 To provide seismic integrity and/or protection of SR components.

3 These components are scheduled for replacement.