LIFE CYCLE MANAGEMENT

LICENSE RENEWAL PROGRAM

PROGRAM PLAN

Rev. 0

July 1993

WESTINGHOUSE OWNERS GROUP

LIFE CYCLE MANAGEMENT / LICENSE RENEWAL PROGRAM

EXECUTIVE SUMMARY

In February, 1993, the Westinghouse Owners Group (WOG) authorized the Life Cycle Management / License Renewal Program to resolve the following issues and concerns:

- Management of Aging
- Establishment of a consistent approach to license renewal
- Reduction of the cost of license renewal
- Integration of similar activities with the Maintenance Rule
- Participation in activities with other industry organizations

Program direction is vested in the LCM/LR Working Group, comprised of representatives from all WOG members.

A major effort of the Program is the preparation of Generic Technical Reports documenting effective life cycle management techniques for those plant systems and components (treated as commodity groups) considered important to license renewal. These Technical Reports are prepared as non-proprietary WCAPs and submitted to the NRC for review and approval. The Reports guide member utilities in their efforts at managing aging in important plant components, while providing a document to be referenced in their plant-specific license renewal applications. A two-part database effort supports the Technical Report process: First, plant environmental and equipment information from all WOG plants is used to determine plausible aging mechanisms on a bounding basis. Second, a collection of current applicable industry information on aging mechanisms and effective maintenance programs supports the life cycle management recommendations.

Significant participation in industry activities related to interpretation and implementation of the license renewal rule (10CFR54) assures that the WOG interests are addressed.

WESTINGHOUSE OWNERS GROUP

LIFE CYCLE MANAGEMENT / LICENSE RENEWAL PROGRAM

PROGRAM PLAN

Rev. 0

July 1993

APPROVED: R. A. Newton 7/1/93

R. A. Newton, Chairman, LCM/LR Working Group Date

APPROVED: T. A. Meyer 7/1/93

T. A. Meyer, Westinghouse Program Manager Date

WOG LCM/LR PROGRAM PLAN

TABLE OF CONTENTS

1. INTRODUCTION

1.1 PROGRAM GOALS

Given the rapidly growing interest in, and need for, Life Cycle Management and License Renewal, this Program has been developed for the WOG to enable it to:

- exert a leadership role in the industry in these areas,
- assure that its member utilities' interests are reflected in all industry initiatives, and
- provide a means to integrate LCM (Life Cycle Management), Maintenance Rule and License Renewal requirements to the technical and economic benefit of WOG members.

The Program is intended to provide benefits to utilities who currently or expect to pursue license renewal in the future as well as to provide benefits to all plants, including the newer plants, by providing aging management and life cycle benefits.

1.2 ORGANIZATION OF THIS PLAN

This Program Plan is divided into five major sections.

The first section provides an overview of the program up to the time when this program plan was developed.

The second section provides a detailed description of the program tasks to be performed, describes the policies and procedures under which the tasks will be performed, and presents a detailed schedule completion of major tasks and subtasks.

The third section describes the management structure for both the WOG and Westinghouse and defines the responsibilities and relationships of the different parties.

The fourth section describes the mechanisms for financial, cost, and technical management of the program, including the types of reports to be developed to document progress, their frequency, and their distribution.

The fifth section describes the communications utilized to execute this program, including phone, fax, meetings, status reports to the WOG, and industry interactions.

An appendix provides a description of a composite reference plant which will be used to develop test cases and examples for the methodologies evolved under this program.

1.3 OVERVIEW OF THE LCM / LR PROGRAM

Starting with its inception, the WOG LCM/LR Program has differed in many respects from previous WOG programs. Initially motivated by industry concerns for the license renewal process, endorsed by the Executive Advisory Committee, and then approved as a multi-year, multi-million dollar program, the Program included a specific task to clarify both scope and cost. The following overview sections describe the major activities leading up to the development of this Program Plan.

1.3.1 INDUSTRY ACTIVITIES

By the end of 1992, interest in Life Cycle Management / License Renewal and related activities within the industry had increased significantly as illustrated by the following events:

- The initiation of the B&W Owners Group Program on License Renewal and its active interaction with NRC in developing/resolving policy issues for the industry,
- The active interest in license renewal of individual utilities such as the Calvert Cliffs plant,
- Active industry support funded by utilities through EPRI involving LCM/LR program development,
- The establishment of a growing NRC staff to address License Renewal, whose costs are likely to be distributed to all utilities, including WOG plants,
- The growing realization that as nuclear plants near mid-life of their current license it is becoming increasingly difficult to justify their economic viability because of the decreasing remaining licensed life,
- The current and growing need for aging management to support economic as well as safety concerns that might also support future license renewal requirements,
- The need to comply with the Maintenance Rule over the next 3 to 4 years, with this compliance expected to directly support license renewal requirements,
- The funding of license renewal activities by EPRI in their Request for Proposal RFP 3075-7,
- The potential for other industry financial support for aging management / license renewal activities such as DOE.
- Utility initiatives focused through NUMARC to maintain/improve nuclear plant cost competitiveness and achieve maximum utilization of the facilities useful life.

1.3.2 PROJECT AUTHORIZATION

The Project Authorization was developed over a relatively short period of time to enable the WOG members to participate in the industry activities and obtain the benefits summarized above through approval of an overall program. Given the short period available to develop this program, future changes were anticipated. In order for the WOG to define and control such changes, the development of this Program Plan was included as a specific program task.

The program objectives of the Project Authorization are as follows:

- Take advantage of previous and ongoing industry work on aging management (NPAR) and the lead plant program (NUMARC/NUPLEX) for application to aging management concerns including:
  - Maintenance Rule compliance,
  - O&M cost reductions, and
  - economic viability of nuclear plants including LCM
  - identification/mitigation of operational risks and uncertainties

- Reduce the cost of license renewal for individual utilities by:
  - Resolving technical issues on a generic basis
  - Using EPRI/DOE funding wherever possible to minimize program cost
  - Working with NUMARC to integrate License Rule / Maintenance Rule and to resolve other policy issues.

- Establish a consistent approach to license renewal for WOG plants

- Establish an Aging Management Information System to support WOG aging management and license renewal efforts.

- Take advantage of the premise that NRC acceptance of generic work is more likely since it reduces their resource requirements, resolves Westinghouse issues on a generic basis, and promotes a more stable, predictable licensing environment.

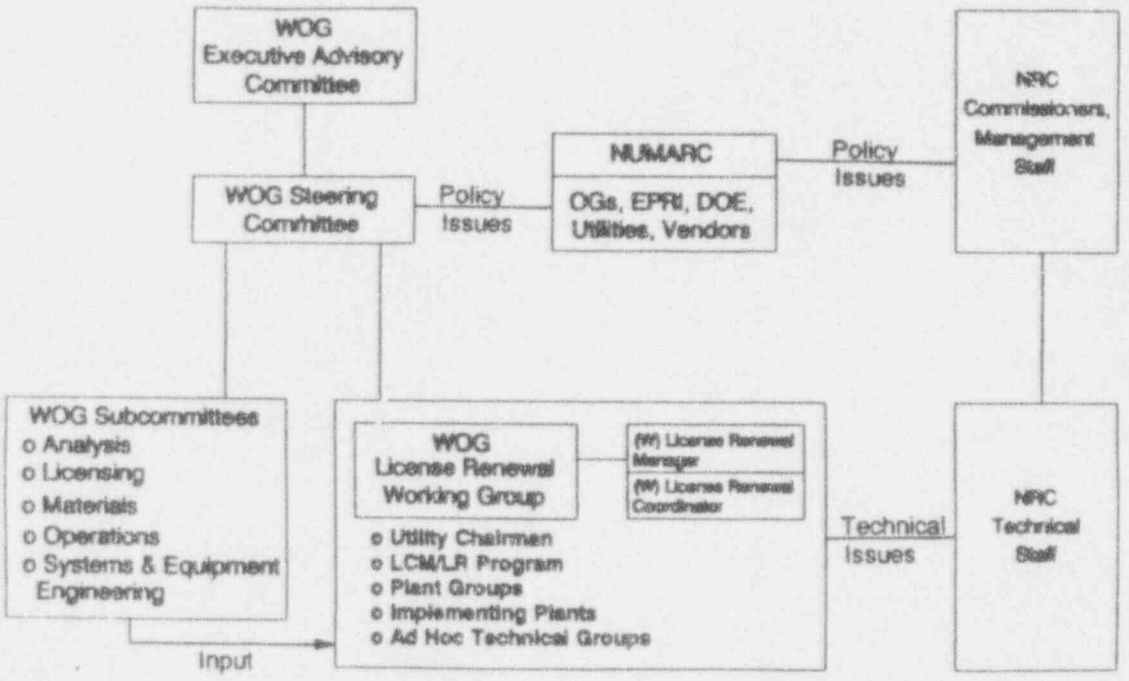
1.3.3 EPRI PROPOSAL

On December 11, 1992, EPRI issued a Request for Proposal, RFP3075-7 "License Renewal Technical Demonstration Plants - Resolution of Generic PWR License Renewal Issues." The stated objective of this program is to "resolve key license renewal technical issues on a generic basis for Westinghouse, Combustion-Engineering and Babcock & Wilcox units." Task 2 in the Project Authorization included the effort to respond to the RFP on behalf of the WOG and to obtain EPRI financial support for a portion of the work scope anticipated for this WOG LCM / LR program.

1.3.4 WORKING GROUP

As part of the Program Management organization proposed in the Project Authorization, a Working Group was defined, made up of utility members, which would direct and control all work performed in support of the Program. Figure 2-1 illustrates the management structure

Figure 2-1
WOG LCM/LR PROGRAM MANAGEMENT STRUCTURE
PROPOSED IN THE PROJECT AUTHORIZATION



proposed in the Project Authorization for the Program, including the initial definition of the Working Group.

2. PROGRAM DESCRIPTION

The following sections describe the tasks to be performed in this Program to accomplish the program objectives given in Section 1.3.2.

A basic premise of this program is that the work will be performed on a "bounding technical analysis" basis. It is the intent of the following work scope to address, via "bounding technical analyses," only those issues that are common to all WOG plants or defined categories or groups of WOG plants. The resulting Generic Technical Reports will address LCM, the

maintenance rule, and license renewal, and will be designed to be used to establish a firm technical basis to implement aging management / life cycle management programs, and to be referenced by individual licensees as part of their plant specific License Renewal Applications. Efforts that are clearly plant specific or apply to a plant specific License Renewal Application are not part of this WOG program.

2.1 SCOPE OF WORK

The original scope of work presented in the Project Authorization was acknowledged to be limited in detail. This section provides expanded detail for each of the nine tasks to clarify the nature of the work to be performed, deliverables, schedules and costs.

2.1.1 TASK 1, PROGRAM MANAGEMENT

The initial program task requires development of a Program Plan which describes how the Program will be managed, controlled and coordinated with NUMARC and other related industry activities. While the initial Program plan, scope and costs were defined in the Project Authorization to facilitate approval and implementation of the Program as soon as possible for the benefit of the WOG, some of the detailed scope and corresponding costs remained to be clarified.

The Program Plan documents utility and Westinghouse program management structure, the program control procedures, the WOG utility interfaces and the means by which this program will coordinate its efforts with other industry programs and groups such as the B&W Owner's Group Generic License Renewal Program and NUMARC. The Plan explicitly considers and supports periodic meetings with both NRC and NUMARC.

2.1.1.1 Detailed Scoping / Cost Estimates

The Program Plan defines the number of technical reports to be developed, and from this derives a more accurate cost estimate for the entire program. The Plan allows for scope and schedule adjustments to control the cost to the WOG in any particular year.

2.1.1.2 Schedule

The Program Plan provides a schedule for initiation and completion of all of the detailed tasks defined as part of this program. The tool used to develop the schedule has sufficient flexibility to permit frequent schedule adjustments and to test different schedular assumptions (e.g., the time required to complete NRC review/approval of a technical report).

2.1.1.3 Process Development

The Program Plan includes the development of needed guidelines and tools to facilitate the completion of subsequent LCM, maintenance rule, and LR tasks. These "process aids" will be used subsequently to standardize work efforts performed by different functional groups over an extended period.

2.1.1.4 Quality Assurance (QA)

The Program Plan defines the necessary QA procedures to be followed to assure the technical accuracy and consistency of the documents produced by this Program. All work performed in this Program will meet the Westinghouse WCAP-8370 Quality Assurance Requirement.

2.1.2 TASK 2, EPRI PROPOSAL DEVELOPMENT

2.1.2.1 Issue Proposal

This Task includes the effort to respond to the RFP on behalf of the WOG in order to obtain EPRI financial support for a portion of the work scope in the WOG LCM / LR program. This Task has been completed with the submittal of a completed proposal to EPRI on March 12, 1993.

2.1.2.2 Oral Presentation

EPRI requested an oral presentation of the proposal to their LCM committee members. This presentation was made as requested on March 30, 1993.

2.1.2.3 Contract Negotiation

This stage of Task 2 will define the exact scope and terms & conditions of the contract.

2.1.3 TASK 3, GENERIC TECHNICAL REPORTS

Three types of generic technical reports are considered: system, commodity, and major component. The process for preparation of the reports is the same and is graphically illustrated in Figure 2-2. There are the following five phases to the preparation of topical reports:

1. The project startup phase which includes the development of system boundaries, commodity groupings, data surveys, report contents, unique issues and available information. The deliverables are boundary and group definitions and the report table of contents.

2. The program and aging basis review phase which includes gathering industry experience, data survey results, function identification, plausible age-related degradation mechanisms (ARDM), performance criteria, and component ARDM matrices. The deliverables are ARDM matrices and adequate program checklists.

3. The effective program and alternative evaluation phase which includes applicability of programs to specific ARDMs, technical justification and documentation, economic analyses of alternatives, and potential modifications and one time actions. The deliverables are effective program reports and alternative analysis.

Figure 2-2
TECHNICAL REPORTS PROCESS

1.0 PROJECT STARTUP

1.1 Project Kickoff
1.2 Define System Boundaries, Commodity Groups
1.3 Report Workshop on Boundaries/Groups, Report Contents, Unique Issues and Existing Efforts (Bibliography)
1.4 Data Survey

Deliverables: Boundary/Group Definition, Report T.O.C.

2.0 ADEQUATE PROGRAM AND AGING BASIS REVIEW

2.1 Screen & Index Data per Survey results, Industry experience
2.2 Review Adequate Programs for Function/Function Degradation Performance Criteria
2.3 Aging Analysis of Plausible ARDMs, any unique characteristics
2.4 System / Commodity Report Cross Reference

Deliverables: ARDM Matrix, Adequate Program Checklist

3.0 EFFECTIVE PROGRAMS & ALTERNATIVES EVALUATIONS

3.1 AHTG Meeting (no. 1)
3.2 Effective Program Review for Applicability, Requirements, Economics, Technical Justification
3.3 Review of Alternatives: Analysis, Modifications, One-Time Actions

Deliverables: Effective Programs Report, Alternatives Summary

4.0 VALIDATION AND REVIEW

4.1 Assemble Technical Report Contents
4.2 Technical Group Working Meeting (no. 2)
4.3 Technical Editing
4.4 WOG Review (AHTG, Core Group, Working Group)
4.5 AHTG Meeting to Resolve Comments, Prepare Draft (no. 3)

Deliverable: Draft WCAP

5.0 ISSUE DRAFT REPORT

5.1 Industry Review
5.2 AHTG Working Meeting to Resolve Comments, Prepare Final Copy (no. 4)
5.3 EPRI Information System Inputs
5.4 Issue WCAP

Deliverable: Final WCAP for NRC Submittal

4. The validation and review phase which includes assembling the topical report, technical editing, WOG review, comment resolution and draft report production. The deliverable is a draft report.

5. The final report phase includes industry review, comment resolution, final production editing and issuance of the report. The deliverable is a final report.

2.1.3.1 System Technical Reports Format and Content

The format and content of a system technical report is graphically shown in Figure 2-3 and has the following seven sections:

Introduction: Provide a brief description of the system to distinguish it from other systems; set the mechanical, electrical, and I&C boundaries to provide the cutoff from one system to another; identify the component types to standardize on the level of breakdown of components.

System Function: Develop the system functions using Current Licensing Basis (CLB) information and a function tree format; provide the functions of the system for each FSAR accident analysis; identify any functions provided in the Technical Specifications or docketed in correspondence with the NRC for ATWS, Appendix R, Blackout, and PTS.

Component Function: Establish a generic component function matrix for each component type to standardize functions for components from one system to another; identify the components and their functions associated with each system function.

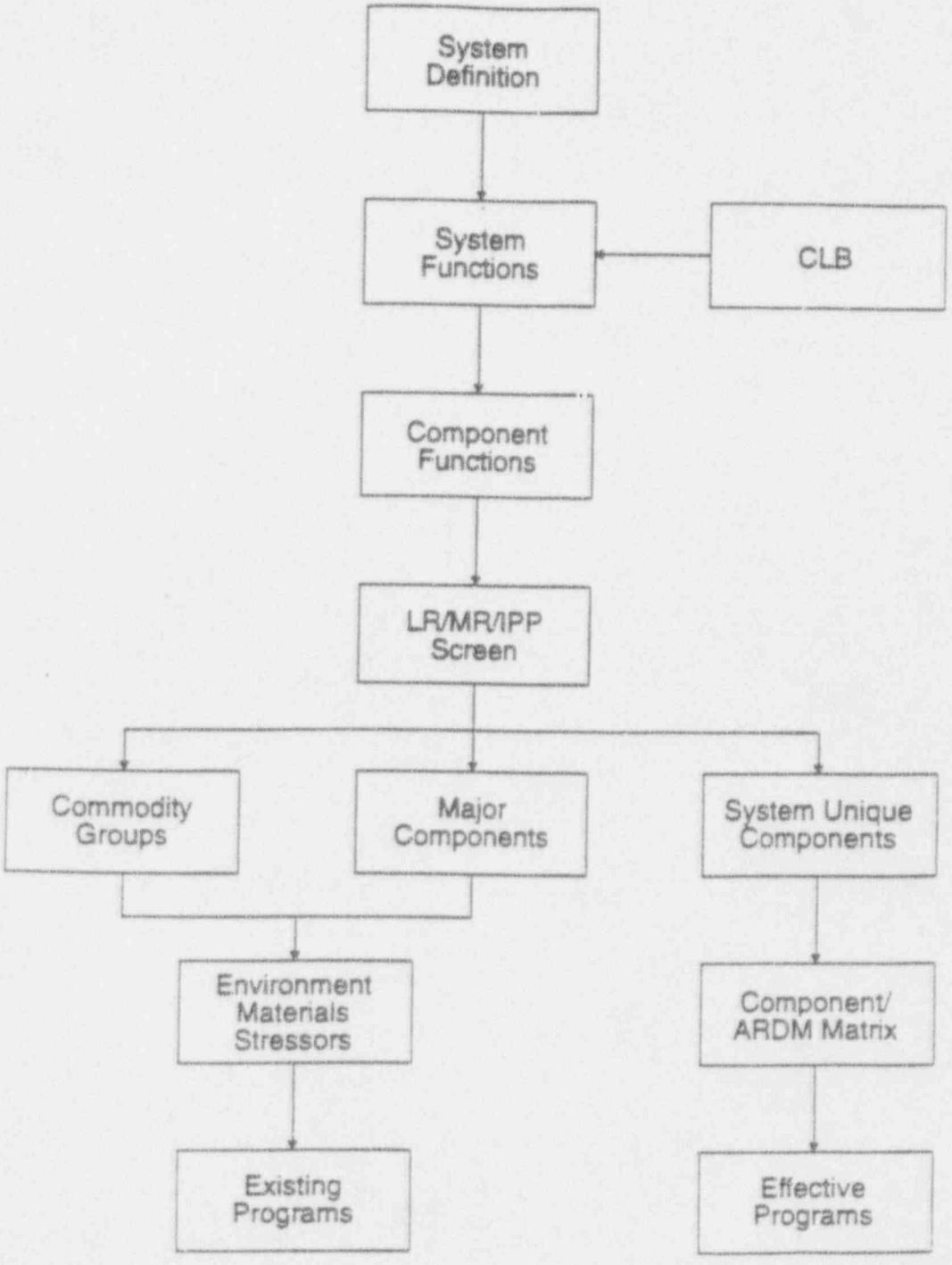
License Renewal Rule/Maintenance Rule Screen: Identify each system functions covered by either the license renewal rule (LR) or maintenance rule (MR); identify the components and their functions associated with the LR or MR.

Component Aging Evaluations: Provide direction on where the components will be evaluated for ARDMs; assign components as commodities, major components or system unique components; separate topical reports will be prepared for commodities and major components; evaluate ARDM for system unique components in System Topical Reports. For EPRI system topical reports, the reports will also contain aging mechanisms and effective aging management evaluations for the system commodity and major components.

Commodity and Major Component Data Collection: Prepare surveys to representative Westinghouse plants to obtain environments, materials, and stressors for commodities and major components; compile the replies into databases with ranges for each parameter; use the bounding value (high or low) for the range to evaluate ARDMs; also solicit listings of existing maintenance programs for the system components from representative Westinghouse plants; provide the databases and existing programs for use in writing commodity and major component topical reports.

System Unique Component Evaluations: Evaluate system unique components in the System Topical Report using expert system methodology to facilitate the large number of evaluations; compile the environment, materials and stressors into a database, prepare a

Figure 2-3
SYSTEM TECHNICAL REPORT PROCESS DIAGRAM



component/ARDM matrix, evaluate the ARDMs against existing maintenance programs, document results and recommend actions if modifications to programs or new programs are required to manage ARDMs.

2.1.3.2 Commodity Group Technical Reports Format and Content

The format and content of commodity group technical reports is graphically shown in Figure 2-4 and has the following five sections:

Introduction: Provide a description of the component types included within the commodity group, the generic functions of the component types, and the system-specific component functions.

Program Identification: Prepare surveys to representative Westinghouse plants to obtain environments, materials, and stressors for commodity, compile survey results into databases with ranges for each parameter, and collect listings of existing maintenance programs.

Aging Evaluation: Evaluate commodity components using expert system methodology to facilitate the large number of evaluations; use the bounding value (high or low) values from the databases for evaluation of ARDMs, and prepare a commodity ARDM matrix.

Effective Program Review: Evaluate the identified ARDMs against existing programs, assure programs have written acceptance criteria and action items if the criteria are not met, and justify and document results.

Alternative Considerations: Provide alternative considerations for effective management of ARDMs by one-time action such as inspection, analytical analysis or potential modifications and redesigns.

2.1.3.3 Major Component Technical Reports Format and Content

(Later)

2.1.3.4 Submittals to NRC

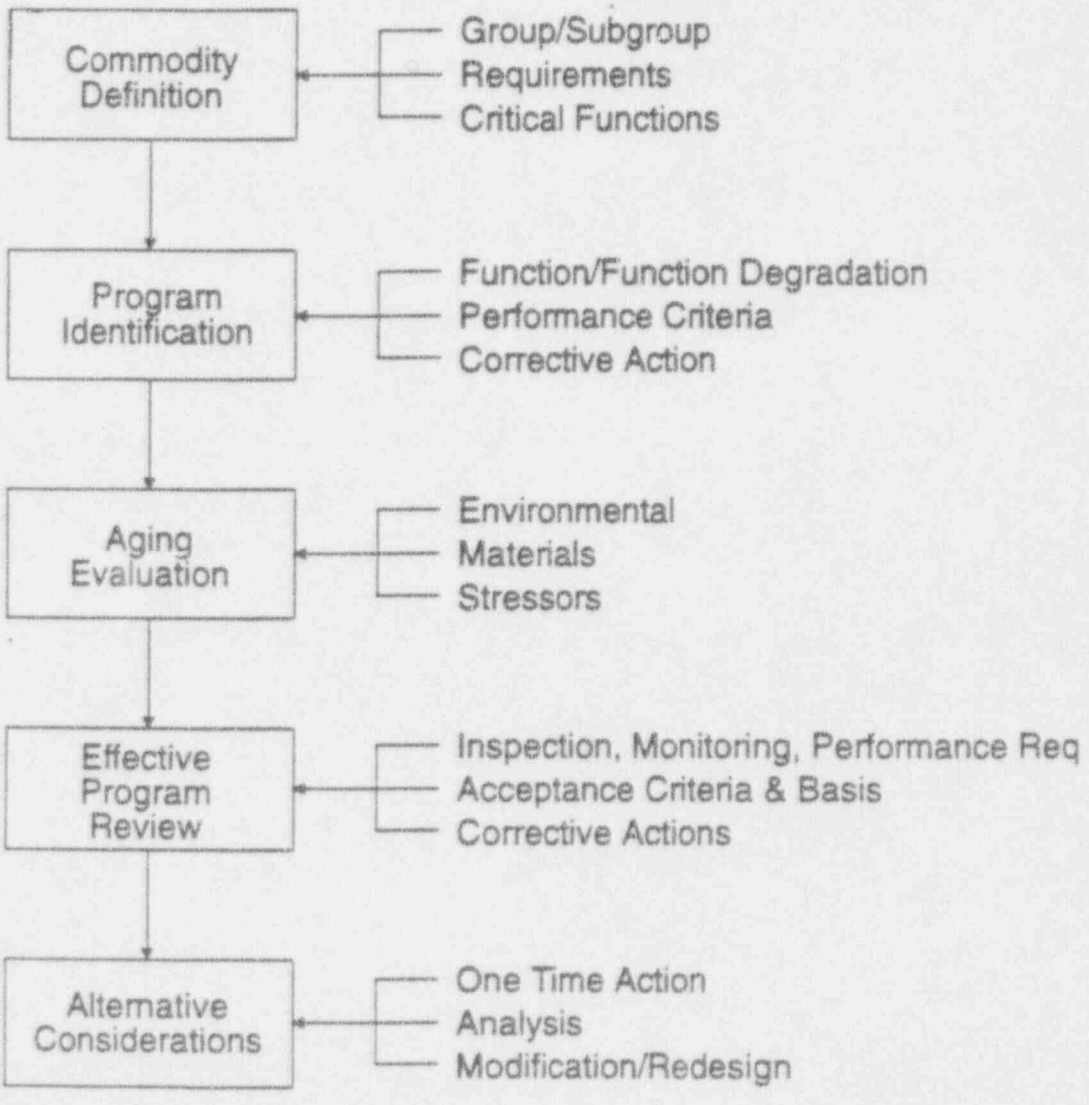
All Generic Technical Reports will be developed as non-proprietary WCAPs and submitted for NRC review and approval, either via a Safety Evaluation Report (SER) or equivalent.

2.1.4 TASK 4, EPRI PROGRAM EXECUTION

The final EPRI program will be a subset of the WOG Program - Task 3, and will consist of the preparation, submittal, and defense of 5 generic technical reports.

In the context of this EPRI RFP, Westinghouse has implemented a teaming arrangement with Gilbert/Commonwealth, Inc. of Reading, Pennsylvania, and Yankee Atomic Electric Company of Bolton, Massachusetts, to jointly work toward the resolution of technical issues for Westinghouse PWR plants. Gilbert/Commonwealth has previous experience in the overall planning of license renewal strategies, while Yankee Atomic was responsible for the lead plant

Figure 2-4
COMMODITY TECHNICAL REPORT PROCESS



activities at the Yankee Rowe plant, and thus bring that expertise to the project. Key technical issues important to license renewal which need to be addressed have been previously identified by several documented studies. These can be grouped into the hardware categories of systems, structures, and components, (SSC) or technical issues. While many of these issues are generic across (effectively) all plants in the domestic nuclear industry, certain ones are specific to the Westinghouse design, but fairly generic across the WOG plants. Because of the large number of plants included in the WOG, these latter items are considered to be the most amenable to resolution using the support of the EPRI License Renewal Program.

2.1.5 TASK 5, PLANT GROUPINGS AND TECHNICAL REPORTS

For the WOG LCM/LR generic evaluations a standardized approach to identification of systems, structures, components, and their functions has been developed. After system boundaries and commodity grouping have been agreed upon for each technical report, plant groupings and bounding evaluations will be used to perform the evaluations. The groupings and bounding analysis will allow the most coverage of plants with each technical report.

2.1.5.1 System and Structure Identification

The generic plant systems and structures will be based on the NPRDS system and structure nomenclature and component types. The NPRDS nomenclature and component types is used by all WOG plants and will easily allow individual plants to compare their equivalent system or structure to the generic system or structure.

2.1.5.2 Functional Grouping

Generic system and structure functions will be obtained by using a base line FSAR accident analyses (such as for a 2-loop plant) and checking the resulting design basis event functions with other plant types to assure that important generic functions are not missed. In the same manner base line technical specifications, ATWS, Appendix R, LCOs, etc. will be selected and checked to assure that all generic important system and structure functions are identified. A generic function tree approach will be used to develop the functions. This approach is simple to understand and can be easily used by individual plants to identify plant-specific functions.

2.1.5.3 Common Groupings

The evaluations of systems, structures and components will be made by grouping plants with common structures, systems, functions and components. An example of a structural groupings would be dry versus wet containments. An example of a system groupings would be high head safety injection systems versus low head safety injection systems. An example of a component groupings would be B31.1 piping versus Section III piping.

2.1.5.4 Bounding Analysis

The technical evaluation of the applicable aging mechanisms for components would use a bounding approach. The stressors, environments, and materials of fabrication for the components will be surveyed and the bounding (either high or low) values for parameters

effecting the mechanism will be used to determine if the mechanism exists. Plant-specific application would then be made by assuring its parameter values were within the bounds of the generic analysis.

2.1.6 TASK 6, GENERIC LCM/LR IMPLEMENTATION PLAN

This task will develop a life cycle / license renewal plan intended for use by all participating WOG plants, that will provide the most cost effective life cycle process, including guidance in the preparation of a license renewal application.

The plan is intended to:

- Provide guidance and implementation methods relative to the process for the preparation and submittal of a license renewal application to the NRC
- Discuss the level of corporate commitment required for a life cycle process in terms of overall objectives and resource requirements
- Identify and discuss strategies to resolve applicable technical issues and integrate other industry efforts such as maintenance rule compliance when applicable.

The goal of the WOG life cycle / license renewal plan is to provide the option for early license renewal and provide economic flexibility for long range strategic planning. The plan will emphasize tasks that preserve the license renewal option and enhance the ability to cost effectively operate the plant during the existing license period.

An initial plan will be developed early in the WOG LCM/LR Program based on a composite of industry experience and WOG initiatives. Later in the program, this Life Cycle / License Renewal Plan will be updated and revised consistent with the technical and policy actions that occur during the implementation of the overall LCM/LR Program. This will enable an initial document to be developed and used to provide guidance during the implementation of the overall Program for the plant group documents and for any individual implementing plants. This approach also assures that the final Life Cycle / License Renewal Plan will take advantage of the Program results and any interim industry actions that may impact the plan.

2.1.6.1 Program Justification and Feasibility

Program goals are provided in terms of economic and technical feasibility. Other considerations typically required for the decision to proceed with a program are identified. Generic economic considerations will be identified and include license renewal costs and costs of replacement power. After incorporation of utility specifics, these considerations can be used as one of the inputs to assess the viability of pursuing a life cycle program.

2.1.6.2 Implementation Logic / Methods

Process logic for tasks associated with the Integrated Plant Assessment will be defined using structured process analysis techniques. Process logic will identify technical / functional requirements, information management considerations, and integration of other applicable

near term requirements such as the Maintenance Rule. Administrative and technical procedure considerations are defined.

2.1.6.3 Project Management Details

Major tasks required to submit, review, and approve a license renewal application will be defined using a detailed work breakdown structure (WBS). Generic schedule and resource (manpower) for each major task will be identified. A cost range process will be identified for evaluating uncertainty factors that can impact the base resource estimate. Major tasks to be addressed include:

- o Integrated Plant Assessment
- o License Renewal Application
  - FSAR Supplement
  - Environmental Impact
  - Revised Technical Specifications
- o Information Management
- o Implementation Planning
- o Major Component & Issues Engineering

2.1.6.4 Life Cycle Strategies

Strategies to combine WOG Program deliverables and EPRI License Renewal initiatives into a total life cycle program will be identified. This section will also identify integration of applicable industry issues. Integration strategies for WOG deliverables and industry issues will identify technical and financial impacts where appropriate.

2.1.6.5 Program Plan Revision

The life cycle program plan will be developed early in the WOG LCM/LR Program based on information currently available for the technical and policy areas identified above. Later in the program, the Life Cycle Plan will be updated and revised consistent with the technical and policy actions that occurred during the implementation of this program. Incorporation of one revision cycle will assure that the program incorporates WOG lessons learned and takes advantage of appropriate industry initiatives such as the EPRI demonstration program.

2.1.7 TASK 7, IMPLEMENTING PLANT IDENTIFICATION

One or more implementing plants will be identified within each of the groupings resulting from Task 5. These plants will be identified on the basis of their own interest and ability to pursue license renewal and could be identified on the basis of an "unnamed" reference plant or a named reference plant.

Each of these plants will proceed to resolve plant-unique issues in their plant-specific License Renewal Applications. The costs associated with the plant-unique issues and any contribution to the plant-specific License Renewal Application (other than referenceable generic technical reports) are not included in this WOG Program but would be the responsibility of the individual plants. The WOG LCM/LR Program will support these implementing plants technically as well

as relative to regulatory policy decisions.

2.1.7.1 Develop Implementation Schedule

This task will also develop a schedule for all WOG plants showing the recommended starting times and potential schedule of activities required for preparing a License Renewal Application, based on the required effort and duration expected as a result of previous Program efforts, and the initial license date of each plant.

2.1.8 TASK 8, LIFE CYCLE MANAGEMENT / MAINTENANCE RULE INTEGRATION

This task will take advantage of industry initiatives in this area and provide recommendations for implementation aimed at integrating the Maintenance Rule (10CFR50.65) and the License Renewal Rule (10CFR54). Life Cycle perspectives will be used to produce cost effective means to implement both rules and also derive O&M cost reductions and improved plant availability for WOG plants.

The equipment scope of both rules is basically similar with many components identified as "important" during the screening process for each rule. Plant O&M practices are the basis for implementing each rule. The license renewal rule requires identification of programs that will be "effective" in managing the effects of age related degradation. The maintenance rule is based on preventative maintenance activities and performance and condition monitoring activities. Note that performance monitoring and goal setting for maintenance rule implementation is performed at the system level and not at the individual component level. Integration of maintenance rule considerations in the WOG program will be based on the following common activities:

2.1.8.1 Screening

Because of the similarity in the "Scope" statements in the two rules, a single screening process will be developed to encompass both rules. This single process will allow individual utilities to screen separately for both rules, if desired.

2.1.8.2 Program Reviews

Review and evaluation of plant O&M practices relevant to both rules will be coordinated. WOG technical reports will be based on two levels of program reviews. Initial program reviews will be based on life cycle perspectives and identify maintenance activities that provide a high degree of confidence that equipment degradation is identified and corrected. The second level of program reviews will identify those attributes required to satisfy the definition of an "effective program " for license renewal:

- Identifying and describing any effects of ARDUTLR
- Describing conditions or parameters used to establish acceptance criteria
- Proposing corrective actions if acceptance criteria are not met
- Identifying administrative controls for implementation

2.1.8.3 Industry Interactions

The WOG approach to maintenance rule integration will be performed in concert with NUMARC and through coordination with other industry groups. Life cycle perspectives are intended to provide a balance of corrective and preventative maintenance activities that can be employed to provide a high degree of confidence that equipment degradation is identified and corrected, that equipment life is optimized, and that the maintenance program is cost effective. Surveillance, inspection and testing activities assure that the equipment needed for safe and reliable operation will perform within required limits. Predictive maintenance monitoring and diagnostic techniques are used to plan maintenance prior to equipment failure. Consideration is also given to alternatives to maintenance such as one-time analysis or modifications.

2.1.9 TASK 9, AGING MANAGEMENT INFORMATION SYSTEM

A computerized Aging Management Information System (AMIS) will be developed to facilitate the collection, storage and manipulation of component, component characteristics and aging management information which will be generated as the WOG LCM/LR Program. AMIS will consist of two basic parts: active databases containing information from WOG plants plus other data necessary for aging degradation evaluations, and a passive, read-only library containing published industry information on aging management. To the extent possible, expert systems or other types of software will be used to screen, evaluate and document aging management results. All information accumulated during this task will be available for use by WOG members.

The initial phase of the database part of AMIS will develop the databases for component types and characteristics needed for aging management. These databases will be populated by replies to questionnaires from representative WOG plants. The second phase will develop the expert systems needed to screen, evaluate and document the aging management results. Figure 2-5 illustrates the expected relationship between the databases and an expert system.

Two types of databases are needed to determine applicable age related degradation mechanisms (ARDMs). Component type databases contain information specific to individual components and the component environmental databases are applicable to the broader areas of system chemistries, building locations, piping classifications and metal types.

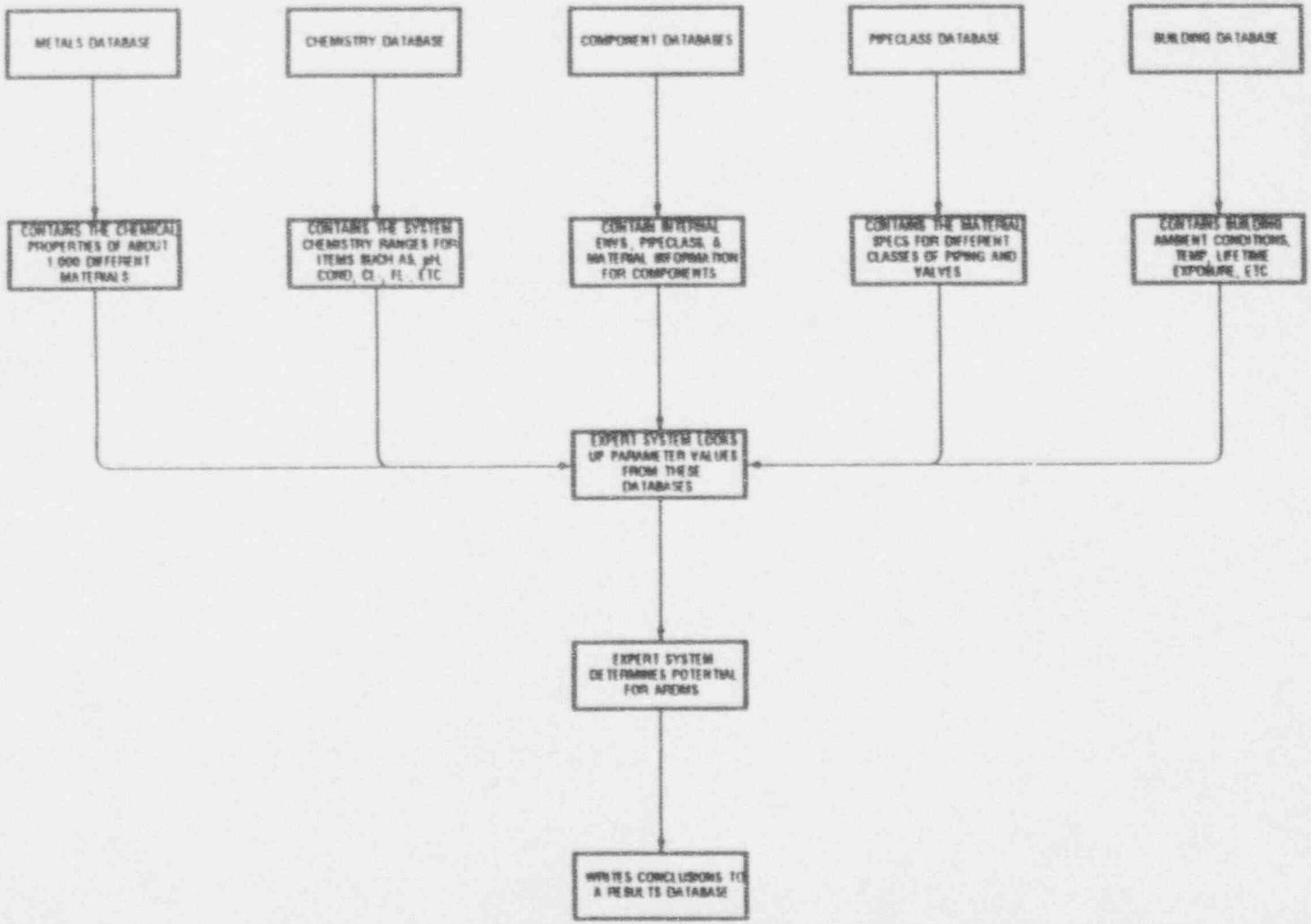
2.1.9.1 Component Type Databases

These databases store component-specific data:

Piping Database

This database contains information on specific piping and includes data on plant identification, number of RCS loops, applicable system, piping classification, building location, type of fluid, size, wall thickness, flow rate, pressure, temperature, insulation, and connection types.

Figure 2-5
EXPERT SYSTEM LINKS TO DATABASES



Valve Database

This database contains information on specific valves and includes data on plant identification, number of RCS loops, valve unique number, valve type, applicable system, piping location, insulation, and connection types.

Heat Exchanger Database

This database contains information on specific heat exchangers and includes data on plant identification, number of RCS loops, heat exchanger unique number, applicable system, flow rates, pressure, temperature, insulation, and connection types.

Tank Database

This database contains information on specific tanks and includes data on plant identification, number of RCS loops, tank unique number, applicable system, insulation, materials of construction and weld types.

Pump Database

This database contains information on specific pumps and includes data on plant identification, number of RCS loops, pump unique number, applicable system, pump type, insulation, and connection types.

Miscellaneous Database

This database contains information on components which do not fit into the other component type databases and include plant identification, number of RCS loops, unique component number, component type, applicable system, insulation, and weld connections.

2.1.9.2 Component Environmental Databases

These databases contain information on system chemistry, metal type, building location and pipe classification.

System Chemistry Database

This database contains the fluid type, water or steam, and the chemistry for each system or subsystem. The types of chemistry stored are chlorine, fluorine, ph, conductivity, etc.

Metal Type Database

This database contains the material constituents of the fabrication of the component and includes carbon, chromium, iron, etc. (ASTM categories)

Building Database

This database stores the temperature and neutron exposure for locations within plant

buildings.

Pipe Classification Database

This database stores the materials and pressure and temperature ratings for standard system valves, fittings and piping.

2.1.9.3 Aging Management Library

This part of AMIS is a read-only collection of significant published industry information relating to life-cycle and aging management. Documents are collected and scanned to obtain electronic images of the text and figures, and retrieval is facilitated by an extensive key-word capability.

2.2 OPERATING POLICY AND GUIDELINES

This section contains the policies under which the program tasks will be executed, and also the guidelines to be used in executing those policies.

Policies and guidelines will be established in written procedures to standardize the generic methodology for performance of WOG LCM/LR activities. The procedures will be of sufficient detail to allow an experienced nuclear industry engineer to reproduce the results and to allow a plant-specific application of the methodology by either reference or reference with some modification to the generic topical reports. The following procedures will be developed as a minimum:

2.2.1 SYSTEM TECHNICAL REPORT PROCEDURE

This procedure provides guidance for a standardized format and content of system topical reports. It includes guidance on system functions, references, evaluation bases, degradation mechanisms, life cycle management, reviews, approvals, issuance and distribution.

2.2.2 COMPONENT TECHNICAL REPORT PROCEDURE

This procedure provides guidance for a standardized format and content of component topical reports. It includes the component types and functions, references, evaluation bases, degradation mechanisms, life cycle management, reviews, approvals, issuance and distribution.

2.2.3 SYSTEM AND STRUCTURE SCREENING PROCEDURE

This procedure provides screening guidance to determine important to License Renewal Rule (ITLR), important to Maintenance Rule (ITMR) and important to power production (ITPP) plant systems and structures. It includes boundary definitions, a reference plant list of systems and structures, function identification, component types, selection criteria, documentation, reviews, approvals, issuance and distribution.

2.2.4 COMPONENT SCREENING PROCEDURE

This procedure provides screening guidance for components in ITLR, ITMR and/or ITPP systems or structures to determine which components are necessary for the system or structure to function, which components are subject to age-related degradation and which components have effective aging management programs. It includes component type generic functions, references, selection criteria, documentation, reviews, approvals, issuance and distribution.

2.2.5 INFORMATION MANAGEMENT PROCEDURE

This procedure provides guidance for database development to ensure that information is accurately entered, stored, processed, maintained and reported. It includes the structure and format of each database, data standardization, database control and security, report generation, reviews, approvals, issuance and distribution.

2.2.6 ACTION ITEMS PROCEDURE

This procedure provides guidance to ensure action items arising from WOG LCM/LR activities are identified, appropriately addressed and their status tracked. It includes a description of the action item, responsible person for generation and closeout, initiating document, scheduled closeout date, actual closeout date and documentation of closeout.

2.2.7 TECHNICAL REPORTS WRITERS GUIDES

Separate Writers Guides will be developed to facilitate the consistent and thorough preparation of the Technical Reports as non-proprietary WCAPs. These Writers Guides will be integrated with the appropriate procedures described above.

2.2.8 USE OF REFERENCE PLANT DESCRIPTIONS

An initial composite reference plant description is provided in Appendix A to facilitate demonstration and testing of procedures developed under this program. The lists of equipment, systems, and source documents can also be used as examples to illustrate technical reports and presentations. This reference plant description will be further modified as required to benefit WOG member utilities' use of the resulting program documents.

2.3 SCHEDULE AND COSTS

This Program was approved by a majority vote at the February, 1993 WOG General Session. The duration of the Program was described in the Project Authorization as 5 years. Therefore, the Program as currently configured will be completed in February 1998.

An initial estimate of relative task durations was provided in the Project Authorization. This estimate is revised as part of this Program Plan to better define Task and sub-Task schedules, and to better determine the Program cost in individual years.

2.3.1 DETAILED TASK SCHEDULE

A list of program milestones was provided in the initial Project Authorization, based on initial estimates of task duration and reflecting attempts to level costs. The first of these milestones, submittal of the EPRI proposal, was completed on schedule. The second milestone, "Initiate work on EPRI program," did not begin as scheduled because of delays on the part of EPRI in issuing a contract.

Starting and completion dates for each of the major Program tasks following development of the Program Plan are shown in the following table. Tasks 3 and 5 involve the preparation of Technical Reports and submittal of those reports for NRC review and approval. These tasks involve significant uncertainty in the completion dates, and it is possible that some will occur later than the end of this Program, February 15, 1998.

SCHEDULE FOR MAJOR PROGRAM TASKS

Task No.	Task Description	Start Date	End Date
1	Program Plan	March 15, 1993	June 1, 1993
2.	EPRI Proposal	February 15, 1993	March 12, 1993
3.	(21) Generic Technical Reports	July 1, 1993	July, 1996
4.	EPRI Technical Reports	July 1, 1993	August, 1994
5.	(13) Plant Groupings / Reports	January 1, 1996	February 15, 1998
6.	Generic Implementation Plan	January 3, 1994	December 30, 1994
	Update Generic Plan	June 2, 1997	December 31, 1997
7.	Implementing Plants / Schedule	January 1, 1996	May 1, 1996
8.	Integration	June 1, 1993	July 31, 1995
9.	Aging Mgmt Information System	June 1, 1993	February 15, 1998

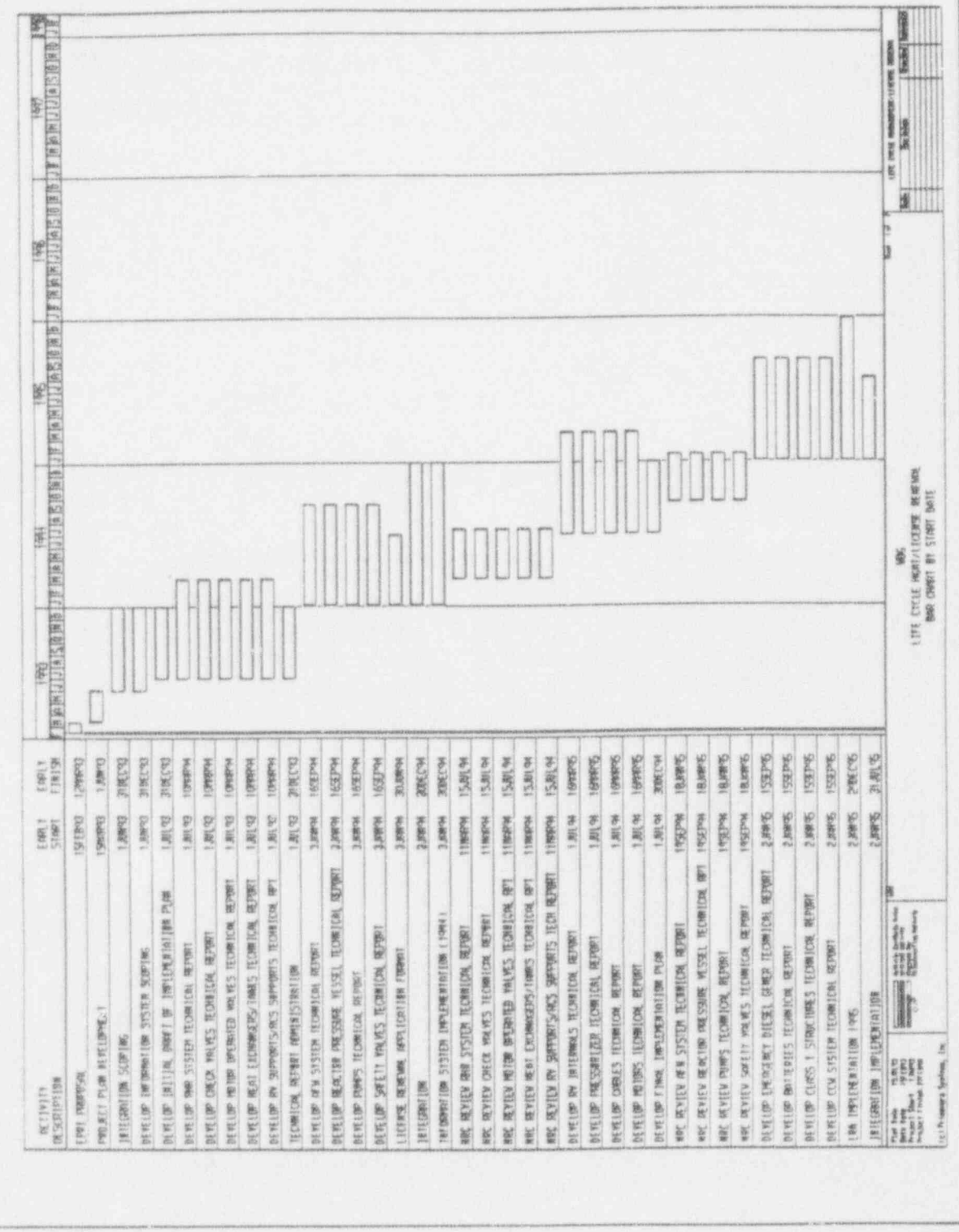
The overall Program schedule is provided as Figure 2-6. To facilitate cost leveling, some of the major tasks have been divided into subtasks, and are identified as such on the schedule.

Starting dates for the development of Generic Technical Reports are as follows. It is recognized that certain reports might be done with separate sections to reflect natural plant groupings (or as separate reports for the different groupings). Group 1 reports are expected to be partially funded by EPRI.

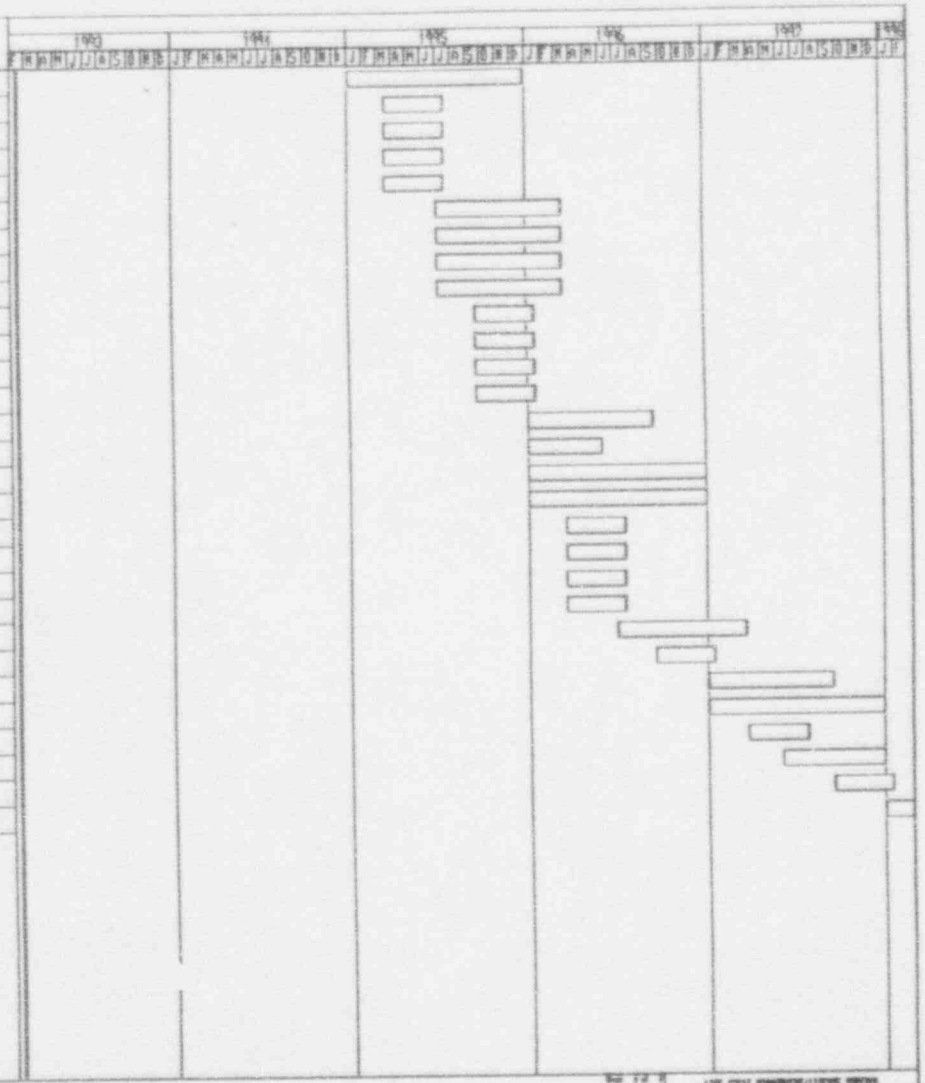
STARTING DATES FOR GENERIC TECHNICAL REPORTS

Task Number & Topic		Start Date
Group 1		July 1, 1993
6110.05	RHR System	
6110.06	Check Valves	
6110.07	Motor Operated Valves	
6110.08	Heat Exchangers/Tanks	
6110.09	RV Supports/RCS Supports	

Figure 2-6
LCM/LR PROGRAM SCHEDULE



ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
INFORMATION SYSTEM IMPLEMENTATION (1995)	2JAN95	29DEC95
NRC REVIEW RV INTERNALS TECHNICAL REPORT	17MAY95	18JUL95
NRC REVIEW PRESSURIZER TECHNICAL REPORT	17MAY95	18JUL95
NRC REVIEW CABLES TECHNICAL REPORT	17MAY95	18JUL95
NRC REVIEW MOTORS TECHNICAL REPORT	17MAY95	18JUL95
DEVELOP CVCS TECHNICAL REPORT	3JUL95	15MAY96
DEVELOP NUCLEAR INSTRUMENTATION TECHNICAL REPORT	3JUL95	15MAY96
DEVELOP NON-NUCLEAR INST (I&C GROUP) TECH REPORT	3JUL95	15MAY96
DEVELOP RCS PIPING TECHNICAL REPORT	3JUL95	15MAY96
NRC REVIEW EMERGENCY DIESEL GEN TECHNICAL REPORT	18SEP95	17JAN96
NRC REVIEW BATTERIES TECHNICAL REPORT	18SEP95	17JAN96
NRC REVIEW CLASS 1 STRUCTURES TECHNICAL REPORT	18SEP95	17JAN96
NRC REVIEW CCW SYSTEM TECHNICAL REPORT	18SEP95	17JAN96
PLANT GROUPINGS/ISSUES - DEVELOP FIRST 4 REPORTS	1JAN96	13SEP96
IDENTIFY IMPLEMENTING PLANTS	1JAN96	21MAY96
LRA IMPLEMENTATION 1996	1JAN96	31DEC96
INFORMATION SYSTEM IMPLEMENTATION (1996)	1JAN96	31DEC96
NRC REVIEW CVCS TECHNICAL REPORT	18MAY96	17JUL96
NRC REVIEW NUCLEAR INSTRUMENTATION TECHNICAL RPT	18MAY96	17JUL96
NRC REVIEW NON NUCLEAR INST TECHNICAL REPORT	18MAY96	17JUL96
NRC REVIEW RCS PIPING TECHNICAL REPORT	18MAY96	17JUL96
PLANT GROUPINGS/ISSUES - DEVELOP SECOND 5 RPTS	1JUL96	21MAY97
PLANT GROUPINGS/ISSUES - NRC REVIEW 1ST 4 RPTS	16SEP96	15JAN97
PLANT GROUPINGS/ISSUES - DEVELOP LAST 4 REPORTS	1JAN97	16SEP97
INFORMATION SYSTEM IMPLEMENTATION (1997)	1JAN97	31DEC97
PLANT GROUPINGS/ISSUES - NRC REVIEW 2ND 5 RPTS	24MAY97	25JUL97
UPDATE FINAL IMPLEMENTATION PLAN	2JAN97	31DEC97
PLANT GROUPINGS/ISSUES - NRC REVIEW LAST 4 RPTS	17SEP97	16JAN98
INFORMATION SYSTEM IMPLEMENTATION (1998)	1JAN98	27JAN98



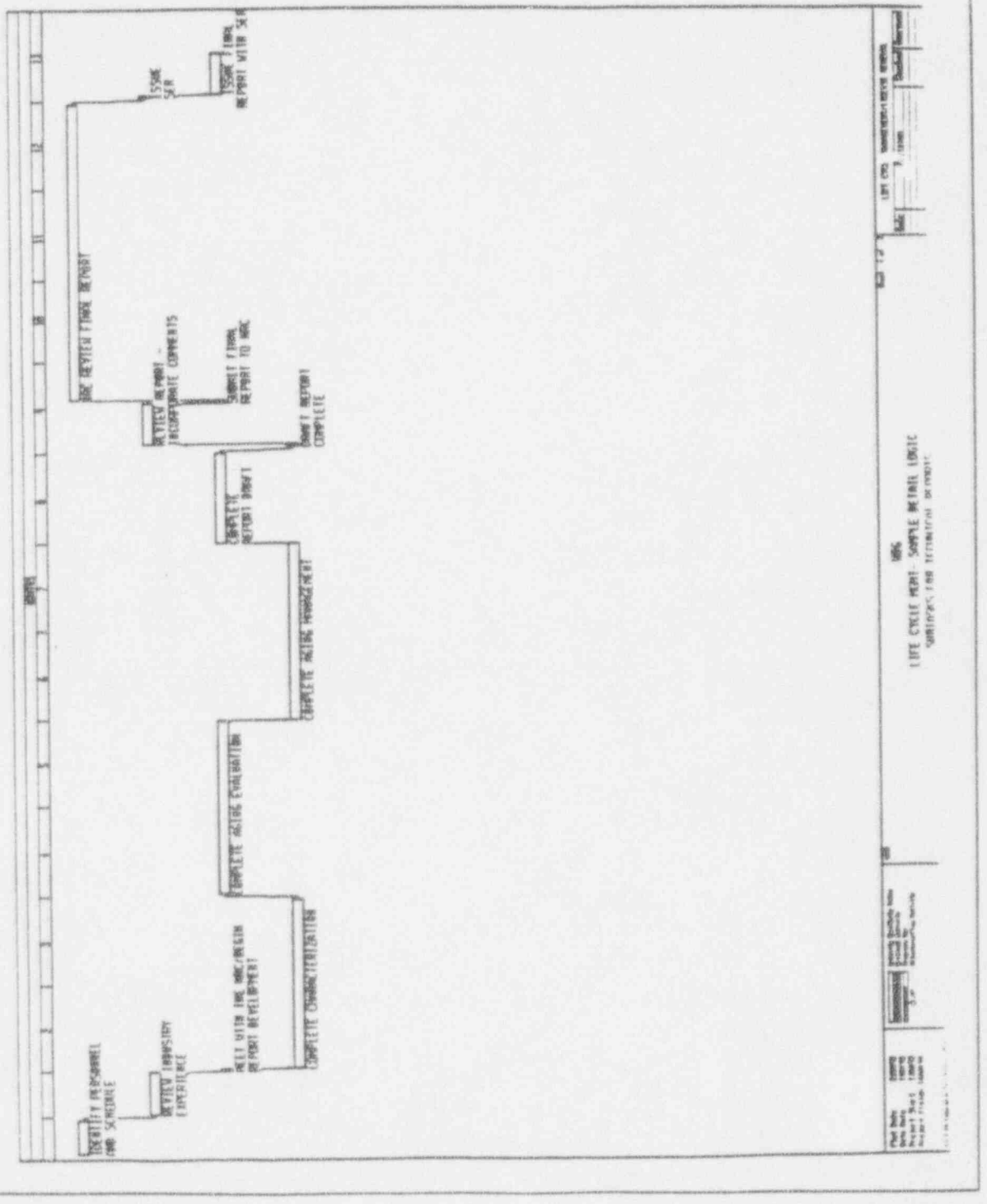
LRA
LIFE CYCLE MGMT/LICENSE RENEWAL
BAR CHART BY START DATE

STARTING DATES FOR GENERIC TECHNICAL REPORTS (CONT)

Task Number & Topic		Start Date
Group 2		January 3, 1994
6110.10	Rx Pressure Vessel	
6110.11	Pumps	
6110.12	Safety Valves	
6110.13	AFW System	
Group 3		July 1, 1994
6110.14	RV Internals	
6110.15	Pressurizer	
6110.16	Motors	
6110.17	Cables	
Group 4		January 2, 1995
6110.18	EDG	
6110.19	Class 1 Structures	
6110.20	Batteries	
6110.21	CCW System	
Group 5		July 3, 1995
6110.22	RCS Piping	
6110.23	Nuclear Instrumentation	
6110.24	Non-Nuclear Instrumentation	
6110.25	CVCS	
6105.01	4 Reports performed as "groupings"	January 1, 1996
6105.02	5 Reports performed as "groupings	July 1, 1996
6105.03	5 Reports performed as "groupings	January 1, 1997

To support the more detailed scheduling required as part of this plan to achieve cost leveling over the Program years, and to consider the contracted needs and schedule of the EPRI program, the completion dates on several of the later milestones have been modified and intermediate milestones added. The following assumptions are made concerning preparation of Generic Technical Reports (Figure 2-7):

Figure 2-7
TYPICAL SCHEDULE FOR GENERIC TECHNICAL REPORT



TYPICAL SCHEDULE FOR GENERIC TECHNICAL REPORT

	Task	Cum. Time to Completion as Draft WCAP
1.	Identify Personnel & Schedule	.5 month
2.	Review Industry Experience	1 month
M.	Meet with NRC, begin report dev.	
3.	Complete characterization	3 months
4.	Complete aging evaluation	5 months
5.	Complete aging management	7 months
6.	Complete report draft	8 months
M.	Draft Report Complete	
4.	Review, comment	8.5 months
M.	Final Report Complete, to NRC	
5.	NRC Review	12 months
M.	SER issued	
6.	Final Report w/SER issued	12.5 months

Using these assumptions, tentative completion dates for the initial Technical Reports can be derived as follows:

PROJECTED COMPLETION DATES (DRAFT WCAP) FOR TECHNICAL REPORTS

Group	Completion Date - Draft WCAP
Group 1	March 16, 1994
Group 2	September 16, 1994
Group 3	March 16, 1995
Group 4	September 15, 1995
Group 5	March 15, 1996
4 Reports performed as "groupings"	September 13, 1996
5 Reports performed as "groupings	March 14, 1997
4 Reports performed as "groupings	September 16, 1997

2.3.2 PROGRAM COST ESTIMATES

Cost estimates have been derived from the assumptions included in the original Project Authorization for each major task and for individual reports. Certain tasks were divided into smaller subtasks to facilitate cost leveling.

Figure 2-8 shows the estimated expenditures by year. Figure 2-9 provides a cost estimate by quarter for the entire Program duration.

Figure 2-8
PROGRAM COST BY CALENDAR YEAR
(values shown have units of $1000)

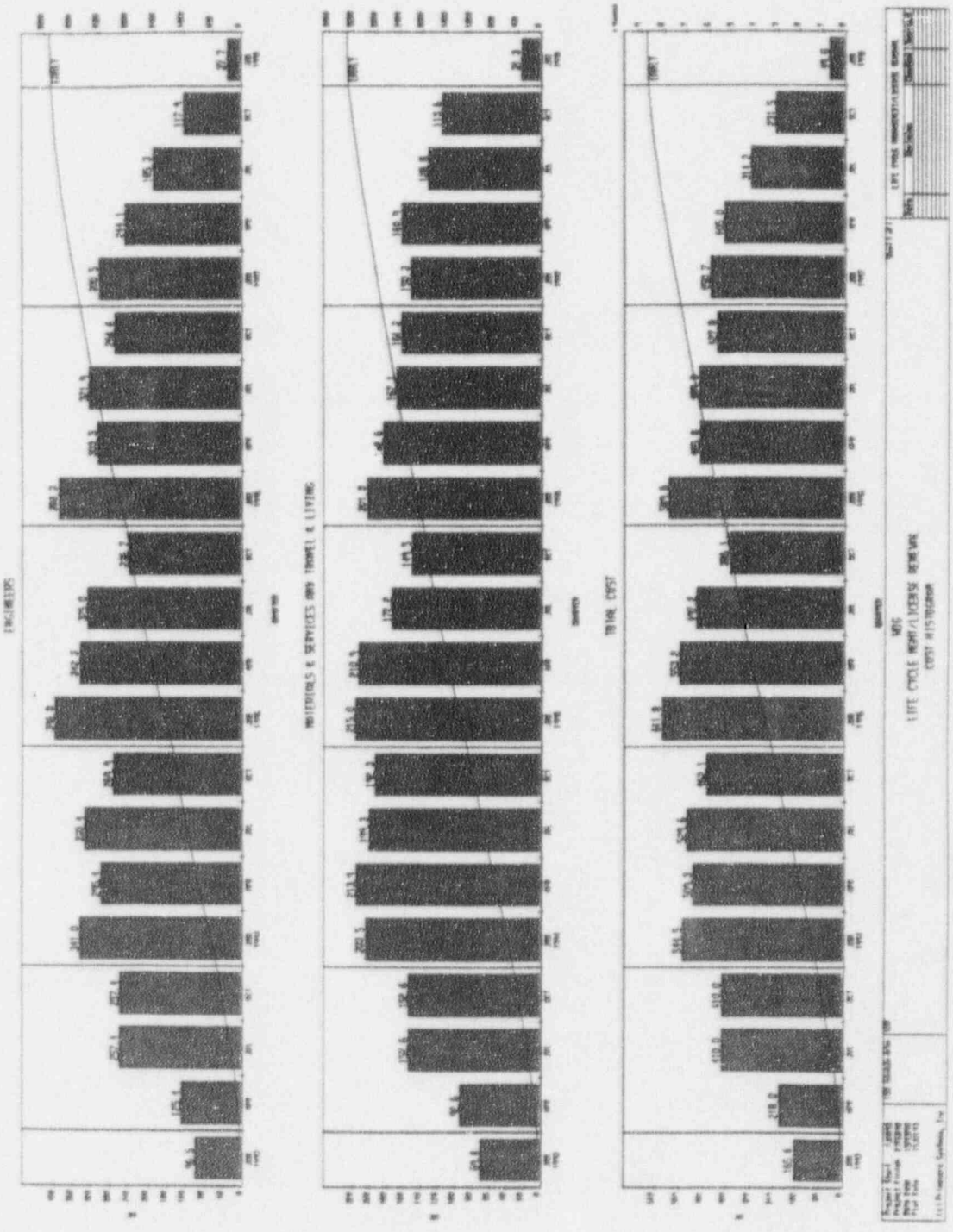
RESOURCE	1993	1994	1995	1996	1997	1998	TOTAL
ENGINEER	743	1242	1298	1274	846	25	5428
TECHNICIAN	97	150	146	141	96	7	637
MATERIAL & SERVICES	267	563	500	479	396	12	2217
TRAVEL & LIVING	104	96	101	92	62	3	458
PROGRAM TOTAL	1211	2051	2045	1986	1400	47	8740
EPRI FUNDING	300	300					600
NET WOG COST	911	1751	2045	1986	1400	47	8140

2.3.3 MAJOR MILESTONES

The major uncertainty in completing Program tasks lies in the time required to complete and obtain acceptance from the NRC on the Technical Reports. While an average time to complete can be proposed, a large number of variables still affect the actual time. For this reason, separate assumptions were made regarding scheduling to evaluate limiting case conditions.

	REMAINING MAJOR MILESTONES	DUE DATE
3.	Complete initial Program Plan	June, 1993
4.	Complete initial Generic LCM/LR Implementation Plan	December, 1994
5.	Issue recommendations/procedure for integration of LR/MR/LCM	December, 1993 (part 1) July 1995 (part 2)
6.	Complete plant groupings matrix	January, 1996
7.	Complete EPRI program	TBD
8.	Complete WOG-Generic technical reports	March, 1996 (WCAPs)

Figure 2-9
PROGRAM COST ESTIMATE BY CALENDAR QUARTER



9.	Update Generic LCM/LR Implementation Plan	December, 1997
10.	Complete identification of implementing plants and schedule plan	May, 1996
11.	Complete plant-group issues reports	January, 1998
12.	Complete aging management info system	February, 1998

3. PROGRAM MANAGEMENT

This section describes the management structures which exist or have been created to support the execution of the Program.

3.1 WOG MANAGEMENT STRUCTURE FOR LCM/LR PROGRAM

The normal WOG procedure for assigning technical issues to one of the technical subcommittees was subverted for this Program because of its size and expected duration. Normally, to effectively deal with specific technical issues, WOG subcommittees routinely establish dedicated working groups; these working groups are dissolved when the initiating technical issue is resolved.

3.2 LCM/LR WORKING GROUP

For the LCM/LR Program, a Working Group was established which reports directly to the WOG Steering Committee. This arrangement facilitates direct reporting of status, and permits frequent policy direction. Figure 3-1 illustrates the current working group structure.

3.2.1 CHAIR, VICE-CHAIR, AD HOC TECHNICAL GROUP COORDINATOR

The Working Group chairman is appointed by the Steering Committee. Utility personnel are proposed for the positions of vice-chair and Ad Hoc Technical Group (AHTG) coordinator with concurrence by the Working Group members.

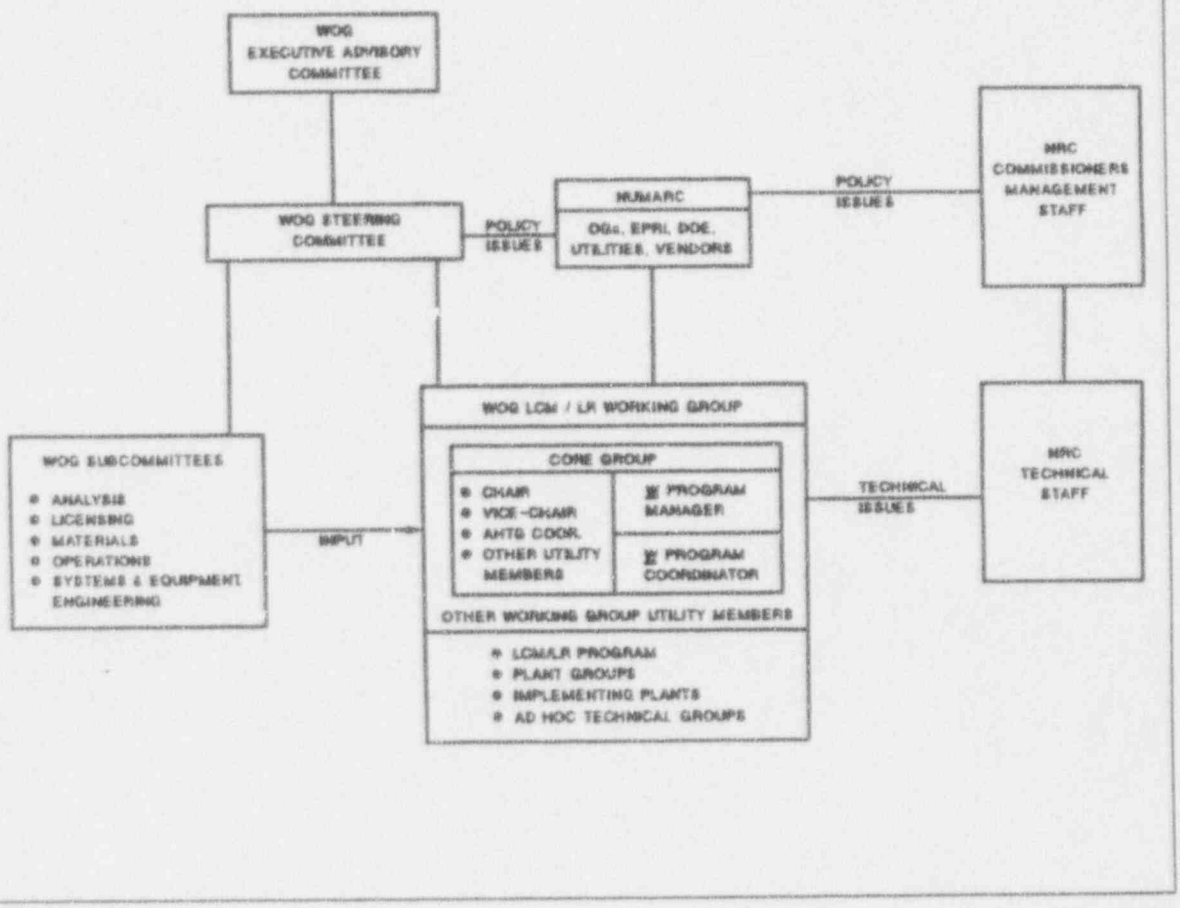
3.2.2 CORE GROUP

A core group consisting of 6-8 utility members is derived by consensus from the larger Working Group membership. The core group will provide technical direction and monitor the program on a day-to-day basis.

3.2.3 AD HOC TECHNICAL GROUPS

Ad hoc technical groups are formed from the Working Group membership to support the development of identified technical reports. Each AHTG will be chaired by a member of the Core Group, and will include a technical lead from Westinghouse. Membership on each AHTG will be based on the issue being addressed, and will come from WOG utility members, Westinghouse, and/or subcontractors, as needed.

Figure 3-1
LCM/LR MANAGEMENT STRUCTURE



3.2.4 CHARTER

The organization of the Working Group, its officers, functions, and duties, are provided in a dedicated Charter.

3.3 WESTINGHOUSE INTERNAL MANAGEMENT STRUCTURE

3.3.1 PROGRAM MANAGER

The Westinghouse Program Manager will have overall responsibility for the timely and accurate execution of all program tasks. He will also be cognizant of all subcontractor arrangements.

3.3.2 PROGRAM COORDINATOR

The Westinghouse Program Coordinator will be responsible for day-to-day functioning of the Program. Along with the Program Manager, the Program Coordinator will facilitate tracking of task completions, addressing schedular impacts, supporting all meetings and presentations, providing the periodic reports to the Working Group chairman, and completion of all paperwork associated with subcontractor relations.

3.3.3 MANAGEMENT ADVISORY GROUP

This group of upper Westinghouse management is kept aware of Program progress, and facilitates the performance of tasks by Westinghouse personnel.

3.3.4 TECHNICAL ADVISORY GROUP

This group consists of Westinghouse functional managers and lead technical personnel and provides technical direction to the different tasks being performed in-house.

3.3.5 WOG PROJECT OFFICE

The WOG Project Office supports the LCM/LR Working Group via a project engineer and management attention, as required. This office provides the WOG financial tracking information and supports meeting scheduling/arrangements and communications as necessary.

4. PROGRAM CONTROL

This section contains descriptions of the mechanisms which will be used to control (through regular monitoring) Program expenditures, task completion, and adherence to schedule.

4.1 CONTROL OF THE PROGRAM PLAN

This Program Plan contains information essential to the successful execution of the WOG LCM/LR Program. As such, it is a controlled document and subject to a signoff procedure when revised.

Each approved version of the Program Plan will bear the signatures of the WOG LCM/LR Working Group Chairman and the Westinghouse Program Manager. The signatures attest that the information in that version is accurate, has been reviewed by Core Group members, and current at the time of signing. The revision date will correspond to the signature date. The revision number will increase by one for each signed revision; the initial version will be Rev. 0.

Revisions to the Program Plan can be made as often as necessary to reflect the changes that are certain to occur during the life of the Program. A record of the changes will be maintained as part of the Program Plan (Appendix D).

4.2 TRACKING OF SCHEDULE, COST, TASK PERCENT COMPLETION

The tasks included in the schedule presented in Section 2 will be reviewed on a regular basis to determine extent of completion. Each major task will be divided into subtasks to reflect individual work items. Completion percentages will be provided by individual technical lead engineers. From these, a composite completion percentage will be calculated for each major task. This will allow the validity of schedule completion dates to be assessed.

Similarly, the WOG cost accounting system will be used to compile a percent expenditure for each major item on the task schedule. From this information, a comparison can be derived of the expenditures relative to task completion.

4.3 STATUS REPORT DESCRIPTION, FREQUENCY & DISTRIBUTION

Several types of reports will be developed on a monthly basis to document program progress to date:

Summary of expenditures, by task
Summary of percentage completion, by task
Summary of milestones completed
Any impacts on the original schedule, and resulting adjustments
Personnel active in the program

5. PROGRAM COMMUNICATIONS

This section describes the means, frequency and intent of communications within the WOG, between WOG and Westinghouse, within Westinghouse (and its subcontractors), and between Program parties and other industry parties.

5.1 ROSTER OF WORKING GROUP MEMBERS

This list is maintained by the WOG Project Office and includes names, mailing addresses, and phone and fax numbers.

5.2 MEETINGS, FREQUENCY & ATTENDANCE

The WOG LCM/LR Working Group will meet approximately four times per year. These meetings will be held at locations convenient to member utilities. Representatives of all WOG member utilities and cognizant Westinghouse personnel are invited to these meetings.

The WOG LCM/LR Core Group will meet approximately once per month, or as deemed necessary by the Working Group Chairman or the Core Group. These meetings will generally be scheduled in Pittsburgh to have improved access to Westinghouse personnel involved in the program. Because these are working, technical meetings, representatives of other Owners Groups and NUMARC will routinely be invited, along with all of the Core Group utility and Westinghouse members.

The Ad Hoc Technical Groups will meet on an as-needed basis to support development of the Generic Technical Reports. The Technical Reports Process in Figure 2-2 identifies four specific meetings of the AHTG for a particular report, but also includes a "kickoff" and a "workshop." It is expected that the AHTGs responsible for the first Technical Reports will probably meet six or seven times over the 8 months allocated for report production. Later AHTGs might not need to meet as often due to process refinements.

Additional meetings with other Owners Groups, NUMARC and the NRC are expected to occur on a regular basis as the Program is developed and matures. Attendance at these meetings will generally be limited to the Core Group Chairman, Vice-Chairman, and AHTG coordinator, and the Westinghouse lead personnel.

5.3 REPORTING TO STEERING COMMITTEE, SUBCOMMITTEES

LCM/LR Program Status will be provided at every meeting of the WOG Steering Committee and at every General Session. Regular updates will be provided to WOG subcommittees as requested for information purposes.

5.4 INDUSTRY INTERACTIONS

It is expected that NUMARC will provide the forum and organizational structure for the WOG Program to interact with other related industry programs, and in presenting a united industry voice to promote resolution of license renewal rule issues.

APPENDIX A. REFERENCE PLANT DESCRIPTION

NPRDS (INPO) SYSTEM DEFINITIONS

EXPANDED BY SYSTEM DESCRIPTIONS FROM WOG TRAP PROGRAM

This system listing is derived from a similar listing used in the WOG Trip Reduction and Assessment Program (TRAP), which, in turn was derived from the Nuclear Plant Reliability Data System (NPRDS) designations and definitions. It locates equipment within particular systems to permit accurate groupings and system assessments. The TRAP list was expanded based on comparisons with system and building listings for a representative composite of WOG plants. These added systems/buildings are highlighted by having their text in upper case letters.

NOTE: This description will continue to be developed as the program matures.

SYS	SYSTEM NAME	DESCRIPTION
AAD	Control Room A/C	Equipment for heating, cooling, filtering control room air, provision for isolation/recirc mode
AAE	Aux. Building Ventilation	Equipment for heating, cooling, filtering auxiliary building atmosphere. Supplemented by individual room coolers for safeguards pumps and equipment. Ducting, fans, filters, dampers to exhaust contaminated air to primary vent stack
AAF	Elec. Equip. Ventilation	Fans, louvers, ductwork to assure cooling of electrical equipment, process and protection gear
AAG	Screen House Ventilation	Fans, louvers and ductwork to either bring in outside air or recirculate air to maintain building temperature
AAH	Turbine Bldg. Vent. Syst.	Fans, dampers, fire dampers, ductwork to maintain building temperature
AAI	ADMIN BUILDING VENTILATION	AIR CONDITIONING, HEATING, FANS, DUCTWORK, LOUVERS, TO MAINTAIN BUILDING TEMPERATURE
ABD	Fire Protection System	Fire detection and suppression equipment, firewater pumps, spray nozzles, piping, also halon & CO2 subsystems
ACB	TELEPHONE, P.A. SYSTEM	PLANT PAGING SYSTEM, WIRELESS TELEPHONE COMMUNICATIONS SYSTEMS, ELECTRONICS, POWER SUPPLIES

ACC	Emergency Communication	Battery powered phone system for emergency use, wireless (walkie-talkie) handsets
CBH	Reactor Coolant System	Reactor Coolant System, all loops, with pressurizer, PORVs and SVs, pressurizer relief tank, heaters and spray, level and pressure instrumentation (also used for protection) and controls, Reactor Coolant Pumps include motors and any protection circuitry between the main breaker and the pump, seal leakoff paths, and steam generators. Includes RCS flow, temperature, wide range pressure and temperature indications used for protection and control of related systems.
CFF	Accum Tanks	Accumulator tanks, piping, and supporting pressurization systems. Also level and pressure instrumentation
EAC	Offsite Power System	All outgoing power lines beyond the main unit transformer and beyond the unit aux (startup) transformer (which brings power back into the plant). Main switchyard and high voltage transmission lines (typically > 100KV, up to 345KV and 500KV)
EBF	Plant AC Power Systems	All non-safety plant power from 25KV down to 120V. Unit Aux Transformer / Start-up transformer and their respective protective circuitry, service power MCCs, transformers, cables, breakers, busses, relays
EBK	Instrument AC Power Sys.	120VAC Instrument AC Power (Class 1E) inverters and other regulated power supplies feeding instrument AC, distribution busses
ECC	DC Power System and Cont.	All DC systems including batteries and chargers, typically 120 and 250VDC, used as "control power" for breakers
EDC	Elect. Syst. (Protection)	"Safeguards" Class 1E power other than the 120VAC Instrument AC. Diesel driven generators, their respective output buses, all power feeding safeguards buses
EEB	Diesel Generator System	Emergency Diesels, support systems not listed separately, generators, exciter and voltage regulator circuitry
EEC	DIESEL STARTING AIR	AIR TANKS, COMPRESSORS & MOTORS, FILTERS, VALVES & OPERATORS, CIRCUITRY TO CONTROL OPERATION

EEP	DIESEL COOLING WATER	JACKET WATER HEAT EXCHANGER, PUMP & MOTOR, HEATER, SURGE TANK, VALVES & OPERATORS, CIRCUITRY TO OPERATE, PROTECTION CIRCUITS
EEG	DIESEL FUEL OIL	DAY TANK, FILTERS, PUMPS & MOTORS, VALVES & OPERATORS, CIRCUITS FOR PROTECTION AND OPERATION
EEH	DIESEL LUBE OIL	LUBE OIL COOLER, HEATER, PUMPS & MOTORS, VALVES & OPERATORS, CIRCUITRY FOR OPERATION AND PROTECTION
EFA	Lighting System (Emergency)	Plant lighting supplied by emergency power, battery back-up local lighting
EFB	PLANT LIGHTING	NORMAL PLANT LIGHTING SUPPLIED BY SERVICE POWER
EGB	CATHODIC PROTECTION	
EGC	FREEZE PROTECTION	
EGH	GROUNDING	
FCD	Spent Fuel Pit Cooling	Heat exchangers, pumps and motors, valves and operators, piping, filters, demineralizers, to cool and clean spent fuel pool water
FCE	Refueling Water System	Includes RWST and piping up to the suction valves of pumps taking suction on the RWST.
FDF	Fuel Handling & Storage	Spent fuel pool with storage racks, bridge crane, new fuel storage, overhead crane
FDG	Refueling Equipment	Fuel transfer tube and cart, air motor, winch & cables, refueling machine in containment, separate fuel insert handling tools
HAB	Turbine Gen. & Controls	Main Generator and exciter circuitry. Iso-phase conductors and ducts to the main unit output transformer (typically 22k to 345KV) Main transformer. Generator and exciter breakers and protection circuitry
HAC	MAIN TURBINE	MAIN TURBINE SHAFT, BLADES, SHROUDS, CASING, TURNING GEAR, STOP AND CONTROL VALVES, COOLING SPRAY
HAD	MAIN TURBINE LUBE OIL	RESERVOIR, PUMPS & MOTORS, ACCUMULATORS, CONTROL VALVES, PIPING, COOLER
HAF	GENERATOR SEAL OIL	RESERVOIR, FILTERS, PUMPS, PIPING,
HAG	GENERATOR H2 & CO2	STORAGE TANKS, PIPING, MANIFOLDS, VALVES, PRESSURE REGULATORS

HAH	STATOR WATER COOLING	RESERVOIR, COOLER, PUMPS & MOTORS, VALVES & OPERATORS, PIPING
HAI	EH CONTROL AND FLUID SYSTEM	ELECTRO HYDRAULIC CONTROL SYSTEM, INCLUDES FLUID RESERVOIR, PUMPS, RELIEF AND DRAIN LINES, COOLER UNITS, SERVO VALVES, OPERATORS OF MAIN TURBINE STOP AND CONTROL VALVES, AND INTERCEPT VALVES. ELECTRONICS WHICH GENERATES CONTROL SIGNALS FOR SERVO VALVES, INSTRUMENTS WHICH PROVIDE SIGNALS (SPEED, LOAD) ARE PART OF OTHER SYSTEMS. OPERATOR INTERFACE FOR DEMAND SIGNALS ARE INCLUDED HERE
HBC	Steam System	Main Steam System, all piping from SGs to the HP turbine stop valve, main steamline isolation and bypass valves and their operators, steamline safety valves and PORV (atmospheric relief), steamlines up to the stop valves for turbine-driven main feed pump and aux feed pump
HBG	Main Steam Systems & Cont.	Steam crossover piping between the HP turbines and Moisture Separator Reheaters, and piping back to the LP turbines, intercept valves, MSRs, and MSR steam control system and drains.
HBK	EXTRACTION STEAM SYSTEM	PIPING, NON-RETURN VALVES, TRAPS, BETWEEN TURBINE CASING AND FIRST ISOLATION VALVE
HCB	Main Condenser Syst & Cont	Main Condenser Air Removal System, all mechanical vacuum pumps or eductors, piping, pressure sensors
HDA	Turbine Gland Sealing	Turbine Gland Sealing Steam, exhausters, gland steam condenser, pressure control instruments and valves
HEC	Turbine Bypass Systems	Steam Dump System valves and operators, control system circuitry providing signals to valves (instruments are in other systems)
HFD	Circulating Water System	Circulating Water System, pumps and motors (usually located in pumphouse/screenhouse) piping to main condenser water boxes, isolation valves and operators, discharge piping from main condenser to heat sink
HHC	Aux. Feedwater System	Auxiliary Feedwater System, pumps with drivers (both motor and turbine) piping from suction source to main feedwater piping connection, isolation valves, operators and controllers. Does not include start logic for pumps

HHE	Condensate (Incl Cond.)	Main Condenser and Condensate System, pumps (including booster pumps) with their motors and suction/discharge valves, demineralizers, heater drain tanks and pumps, condensing side of all LP feedwater heaters, level controls, extends from the main condenser to the main feed pump suction valve
HHF	Main Feedwater System	Main Feedwater System, main feed pumps and drivers with supporting systems (lube, EHC, valve operators, speed control circuits and protection), main and bypass feedwater flow control valves with their operators and control circuitry. Tube side of HP feedwater heaters, piping from suction of main pumps to steam generator shell / feedring. Steam Generator level control circuitry controls both pumps and valves
HHG	CONDENSATE STORAGE & TRANSFER	CONDENSATE STORAGE TANK, TRANSFER PUMPS AND MOTORS, VALVES AND OPERATORS, CONTROL CIRCUITRY
HIA	S/G Blowdown Processing	
IAD	Nuclear Protection Instr.	Nuclear Instrumentation System, Source / Intermediate / and Power Range channels, each with detectors, power supplies, fuses, cabinets. Interface to protection logic (system IBG) is a bistable signal. Permissives P-6, P-8, P-9, P-10 generated by IAD
IBG	Reactor Protection System	All elements in the signal path from sensors through signal processing circuits, relay or bistable circuits and output controller circuits which are part of the reactor protection function. Output from IBG is a signal to open the reactor trip breakers. Both process (Foxboro, 7100, 7300) and logic (relay and SSPS) equipment
IBK	Engineered Safeguards Sys	Engineered Safeguards System, instruments and associated process and logic which initiates safeguards actions (containment isolation, steamline and feedline isolation, safety injection). This equipment is located along with IBG (Reactor Protection) gear, master and slave relays are unique
IBL	POST ACCIDENT MONITORING	
IBM	SEISMIC INSTRUMENTS	
IBP	METEOROLOGICAL INSTRUMENTS	
IBR	PLANT COMPUTER	

IBX	PLANT SECURITY SYSTEMS	
IEG	Process Protection Instr.	
IEH	Control Boards and Panels	
IFI	Reactor Control System	
MAD	Waste Process Syst - Liquid	
MAE	Equipment Drain System	
MBC	Waste Processing Syst - Gas	
MCC	Radiation Monitoring Sys	
MDA	WASTE PROCESSING - SOLID	
PAA	SERVICE GAS (N2 & CO2)	
PAD	Instrument and Serv. Air	
PBC	Sampling System	
PCG	Chemical & Volume Control	Chemical and Volume Control System, letdown piping and heat exchangers, orifices, pressure control valve, demineralizers, volume control tank, chemical addition system, hydrogen / waste gas connections with pressure controls, boric acid tanks and pumps, demineralized water makeup, makeup control system, RCP seal injection flow, charging (both centrifugal and positive displacement pumps), isolation valves on letdown, charging, altern ate charging, alternate pressurizer spray lines and alternate letdown line. Safety grade charging pumps provide flow to the Boron Injection System. Safety function includes suction valves and recirc (mini-flow) lines.
PCH	Boron Recycle System	Boron Recycle System, holdup tanks, recycle evaporators, demineralizers, storage tanks
PCI	Boron Thermal Regen.	Boron Thermal Regeneration System, piping, valves to direct and control flow, chiller unit, demineralizers
PEB	Auxiliary Steam System	
RAD	In-Core Equip (Mech Only)	
RBD	Rod Cluster Control	
RBK	Control Rod Drive System	Rod Control System, motor/generator sets, power cabinets, logic cabinets, power cables to CRDM coils, main and bypass trip breakers.

RCD	Reactor Core	
SAC	Reactor Bldg Penetration	
SAF	Hot Penetration Cooling	
SBD	Containment Ventilation	
SBE	Containment Heat Removal	
SBF	Ice Condenser System	
SBG	Containment Fan Cooling	
SCE	Containment Spray System	
SCF	Annulus Ventilation Syst	
SCG	Containment Air Return	
SCI	Quench Spray System	
SCJ	Containment Recirc. Spray	
SDB	Containment Isolation Sys	
SED	Combustible Gas Control	
SFH	Safety Injection System	SI system, two trains, with pumps, piping, suction and discharge valves, flow and temperature instrumentation
SFK	HP Safety Injection and UHI	Boron Injection System, including BIT, supporting piping and heat tracing, isolation valves. (Charging pumps remain part of CVCS)
SFL	Low Pressure Safety Injection	RHR System, two trains, including both normal cooling mode and injection mode piping. Includes suction valves and discharge valves (with motor operators), pumps, heat exchangers, cross-connect piping and valves, flow and temperature instrumentation
SHB	Penetration Room Vent.	
SYY	NSSS (General & Refuel)	
WAD	Nuclear Service Water	Service Water / Essential Service Water, pumps (usually located in the pumphouse / screenhouse), piping to heat exchangers, return piping
WBD	Component Cooling Water	Component Cooling Water System, pumps with motors, surge tank, heat exchangers, control valves and operators
WCC	Makeup Water System	
WDD	PLANT HEATING SYSTEM	

WGB	Chilled Water System	
WHI	POTABLE WATER SYSTEM	
WLL	SANITARY DISPOSAL SYSTEM	
WYY	BOP (General)	
WYZ	Plant (General)	
XAA	CONTAINMENT BUILDING	PRIMARY SYSTEM COMPONENTS, STEAM GENERATORS, BIOLOGICAL SHIELD, SECONDARY SHIELD WALL, POLAR CRANE, REFUELING TROLLY/MAST, INCORE MOVEABLE DETECTORS, SPRAY RING MANIFOLDS, RECIRCULATION SUMPS, PENETRATIONS FOR ELECTRICAL/FLUIDS
XBB	AUXILIARY BUILDING	MAJOR AUXILIARY EQUIPMENT: RHR, SI, CHARGING PUMPS, EACH IN SEPARATE ROOMS WITH INDIVIDUAL ROOM COOLERS, CCW PUMPS AND HEAT EXCHANGER, AUX FEED PUMPS, CVCS DEMINERALIZERS/FILTERS, CAMPLING SYSTEM, HOT LABS, RAD PROTECTION, CONTAINMENT ACCESS, LOCKERS, DECONTAMINATION, MAIN CONTROL ROOM, PROCESS AND PROTECTION CABINETS, BATTERIES AND INVERTERS
XCC	SERVICE/ADMIN BUILDING	GENERAL SERVICES: MACHINE SHOPS, LOCKER ROOMS, OFFICES FOR PLANT STAFF
XDD	TURBINE BUILDING	MAIN TURBINE, GENERATOR, EXCITER, MAIN CONDENSER, CONDENSATE AND MAIN FEEDWATER PUMPS, FEEDWATER HEATERS, MAIN FEED REG VALVES (BY EXTENSION, FEED AND STEAMLINE ISOLATION VALVES, STEAMLINE PORVS AND SAFETY VALVES), FEEDLINES AND STEAMLINES, MAIN CONDENSER, MSRs, STEAM DUMP SYSTEM, PRIMARY WATER DEMINERALIZERS, AUX BOILER/CONDENSER, MAIN UNIT TRANSFORMER, UNIT AUX/STARTUP TRANSFORMERS, SITE WATER TREATMENT
XEE	FUEL BUILDING	NEW FUEL STORAGE, SPENT FUEL POOL WITH RACKS, TROLLY WITH CRANE, OVERHEAD CRANE, FUEL POOL COOLING/CLEANUP SYSTEM, FUEL TRANSFER EQUIPMENT,
XFF	DIESEL BUILDING	SEPARATE ROOMS FOR EMERGENCY DIESEL GENERATORS, EACH WITH ITS OWN STARTING AIR, LUBE, FUEL, COOLING SUPPORT SYSTEMS, LOCAL GENERATOR OUTPUT CONTROLS
XGG	RADWASTE BUILDING	COLLECTION POINT FOR ALL RADIOACTIVE WASTE GENERATED ON SITE, TANKS FOR GAS HOLDUP, LIQUID STORAGE, WASTE EVAPORATOR AND DEMINERALIZERS, SOLID WASTE STORAGE, COMPACTING & DRUMMING
XHH	PUMP/SCREEN HOUSE	CIRCULATING, SERVICE WATER, FIRE WATER PUMPS, TRAVELING SCREENS AND SCREEN WASH

XII	SECURITY BUILDING	SITE ENTRY ACCESS POINT, CONTROL POINT FOR PERIMETER MONITORING, PERSONNEL SECURITY RECORDS, EXIT RAD MONITORING

APPENDIX B. GLOSSARY

The following terms and definitions are taken primarily from EPRI brochure BR-101747, "COMMON AGING TERMINOLOGY" A Glossary Useful for Understanding and Managing the Aging of Nuclear Power Plant Systems, Structures, and Components, copyright 1993.

Those terms and definitions preceded by an asterisk are taken from 10 CFR Part 54--Requirements for Renewal of Operating Licenses for Nuclear Power Plants.

accelerated aging	artificial aging in which the simulation of natural aging approximates, in a short time, the aging effects of longer-term service conditions
acceptance criterion	specified limit of a functional or condition indicator used to assess the ability of an SSC to perform its design function
age	(noun) time from fabrication of an SSC to a stated time
age conditioning	simulation of natural aging effects in an SSC by the application of any combination of artificial and natural aging
age-related degradation	synonym for aging degradation
	* a change in a SSC's performance or physical or chemical properties resulting in whole or part from one or more aging mechanisms (i.e. changes in dimension, ductility, fatigue resistance, fracture toughness, mechanical strength, polymerization, viscosity, dielectric strength) (10 CFR 54.3)
* 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 (10 CFR 54.3)
aging	(noun) general process in which characteristics of an SSC gradually change with time or use
aging assessment	evaluation of appropriate information for determining the effects of aging on the current and future ability of SSCs to function within acceptance criteria

aging degradation	aging effects that could impair the ability of an SSC to function within acceptance criteria
aging effects	net changes in characteristics of an SSC that occur with time or use and are due to aging mechanisms
aging management	engineering, operations, and maintenance actions to control within acceptable limits aging degradation and wearout of SSCs
aging mechanism	specific process that gradually changes characteristics of an SSC with time or use * physical or chemical processes that result in degradation (i.e fatigue, erosion, corrosion, erosion/corrosion, wear, thermal embrittlement, radiation embrittlement, microbiologically induced effects, creep, shrinkage) (10 CFR 54.3)
artificial aging	simulation of natural aging effects on SSCs by the application of stressors representing plant pre-service and service conditions, but perhaps different in intensity, duration, and manner of application
breakdown	synonym for complete failure
characteristic	property or attribute of an SSC (such as shape; dimension; weight; condition indicator; functional indicator; performance; or mechanical, chemical, or electrical property)
combined effects	net changes in characteristics of an SSC produced by two or more stressors
common cause failure	two or more failures due to a single cause
common mode failure	two or more failures in the same manner or mode due to a single cause
complete failure	failure in which there is a complete loss of function
condition	surrounding physical state or influence that can affect an SSC; also, the state or level of characteristics of an SSC that can affect its ability to perform a design function
condition indicator	characteristic that can be observed, measured, or trended to infer or directly indicate the current and future ability of an SSC to function within acceptance criteria
condition monitoring	observation, measurement, or trending of condition or functional indicators with respect to some independent parameter (usually time or cycles) to indicate the current and future ability of an

	SSC to function within acceptance criteria
condition trending	synonym for condition monitoring
corrective maintenance	actions that restore, by repair, overhaul, or replacement, the capability of a failed SSC to function within acceptance criteria
* current licensing basis (CLB)	set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect (10 CFR 54.3)
degradation	immediate or gradual deterioration of characteristics of an SSC that could impair its ability to function within acceptance criteria
degraded condition	marginally acceptable condition of an unfailed SSC that could lead to a decision to perform planned maintenance
degraded failure	failure in which a functional indicator does not meet an acceptance criterion, but design function is not completely lost
design basis event	any of the events specified in the station's safety analysis that are used to establish acceptable performance for safety-related functions of SSCs; events include anticipated transients,design basis accidents, external events, and natural phenomena
design basis event conditions	service conditions produced by design basis events
design basis event stressor	stressor that stems from design basis events and can produce immediate or aging degradation beyond that produced by normal stressors
design conditions	specified service conditions used to establish the specifications of an SSC (generally includes margin of conservatism beyond expected service conditions)
design life	period during which an SSC is expected to function within acceptance criteria
design service conditions	synonym for design conditions
deterioration	synonym for degradation

diagnosis	examination and evaluation of data to determine either the condition of an SSC or the causes of the condition
diagnostic evaluation	synonym for diagnosis
* effective program (EP)	documented program to mange age-related degradation unique to license renewal that ensures that an SSC 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 (10 CFR 54.3)
environmental conditions	ambient physical states surrounding an SSC
error-induced aging degradation	aging degradation produced by error-induced conditions
error-induced conditions	adverse pre-service or service conditions of produced by design, fabrication, installation, testing, operation, or maintenance errors
error-induced stressor	stressor that stems from error-induced conditions and can produce immediate or aging degradation beyond those produced by normal stressors
failure	inability or interruption of ability of an SSC to function within acceptance criteria
failure analysis	systematic process of determining and documenting the mode, mechanism, causes, and root cause of failure of an SSC
failure cause	circumstances during design, manufacture, test, or use that have led to failure
failure evaluation	synonym for failure analysis
failure mechanism	physical process that results in failure
failure mode	the manner or state in which an SSC fails
failure modes and effects analysis	systematic process for determining and documenting potential failure modes and their effects on SSCs
failure trending	recording, analyzing, and extrapolating inservice failures of an SSC with respect to some independent parameter (usually time or cycles)

functional conditions	influences on an SSC resulting from the performance of design functions (operation of a system or component and loading of a structure)
functional indicator	condition indicator that is a direct indication of the current ability of an SSC to function within acceptance criteria
inservice inspection	methods and actions for assuring the structural and pressure-retaining integrity of safety-related nuclear power plant components in accordance with the rules of ASME Code, Section XI
inservice life	synonym for service life (especially in discussions involving ASME Code, Section XI)
inservice test	a test to determine the operational readiness of a component or system [ASME Code, Section XI]
inspection	synonym for surveillance
installed life	period from installation to retirement of an SSC
* integrated plant assessment (IPA)	licensee assessment that demonstrates that a nuclear power plant facility's SSCs important to license renewal will be managed to ensure that the facility's licensing basis will be maintained during the renewal period (10 CFR 54.3)
life	period from fabrication to retirement of an SSC
life assessment	synonym for aging assessment
life cycle management	synonym for life management
life management	integration of aging management and economic planning to: (1) optimize the operation, maintenance, and service life of SSCs; (2) maintain an acceptable level of performance and safety; and (3) maximize return on investment over the service life of the plant
lifetime	synonym for life
maintenance	aggregate of direct and supporting actions that detect, preclude, or mitigate degradation of a functioning SSC, or restore to an acceptable level the design functions of a failed SSC
malfunction	synonym for failure

mean time between failure	arithmetic average of operating times between failures of an item [IEEE Std 100]
natural aging	aging of an SSC that occurs under pre-service and service conditions, including error-induced conditions
normal aging	natural aging from error-free pre-service or service conditions
normal aging degradation	aging degradation produced by normal conditions
normal conditions	operating conditions of a properly designed, fabricated, installed, operated, and maintained SSC, excluding design basis event conditions
normal operating conditions	synonym for normal conditions
normal stressor	stressor that stems from normal operating conditions and can produce aging mechanisms and effects in an SSC
* nuclear power plant	nuclear power facility or a type described in 10 CFR 50.21 or 50.22 (10 CFR 54.3)
operating conditions	service conditions, including normal and error-induced conditions, prior to the start of a design basis accident or earthquake
operating service conditions	synonym for operating conditions
operational conditions	synonym for functional conditions
overhaul	(noun) extensive repair, refurbishment, or both
performance indicator	synonym for functional indicator
periodic maintenance	form of preventive maintenance consisting of servicing, inspection, parts replacement, surveillance, or testing at predetermined intervals of calendar time, operating time, or number of cycles
planned maintenance	form of preventive maintenance consisting of refurbishment or replacement that is scheduled and performed prior to failure of an SSC
post-maintenance testing	testing after maintenance to verify that maintenance was performed correctly and that the SSC can function within acceptance criteria

preconditioning	synonym for age conditioning
predictive maintenance	form of preventive maintenance performed continuously or at intervals governed by observed condition to monitor, diagnose, or trend an SSC's functional or conditional indicators; results indicate current or future functional ability or the nature and schedule for planned maintenance
premature aging	aging effects of an SSC that occur earlier than expected because of errors or pre-service and service conditions not considered explicitly in design
pre-service conditions	actual physical states or influences on an SSC prior to initial operation (e.g., fabrication, storage, transportation, installation, and pre-operational testing)
preventive maintenance	actions that detect, preclude, or mitigate degradation of a functional SSC to sustain or extend its useful life by controlling degradation and failures to an acceptable level; there are three types of preventive maintenance: periodic, predictive, and planned
qualified life	period for which an SSC has been demonstrated, through testing, analysis, or experience, to be capable of functioning within acceptance criteria during specified operating conditions while retaining the ability to perform its safety functions in a design basis accident or earthquake
random failure	any failure whose cause or mechanism, or both, make its time of occurrence unpredictable [IEEE Std 100]
reconditioning	synonym for overhaul
refurbishment	planned actions to improve the condition of an unfailed SSC
remaining design life	period from a stated time to planned retirement of an SSC
remaining life	actual period from a stated time to retirement of an SSC
remaining service life	synonym for remaining life
remaining useful life	synonym for remaining life
* renewal term	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 (10 CFR 54.3)

repair	actions to return a failed SSC to an acceptable condition
replacement	removal of an undegraded, degraded, or failed SSC or a part thereof and installation of another in its place that can function within the original acceptance criteria
residual life	synonym for remaining life
retirement	final withdrawal from service of an SSC
rework	correction of inadequately performed fabrication, installation, or maintenance
root cause	fundamental reason(s) for an observed condition of an SSC that if corrected prevents recurrence of the condition
root cause analysis	synonym for failure analysis
service conditions	actual physical states or influences during the service life of an SSC, including operating conditions (normal and error-induced), design basis event conditions, and post design basis event conditions
service life	actual period from initial operation to retirement of an SSC
servicing	routine actions (including cleaning, adjustment, calibrations, and replacement of consumables) that sustain or extend the useful life of an SSC
simultaneous effects	combined effects from stressors acting simultaneously
stress	synonym for stressor
stressor	agent or stimulus that stems from pre-service and service conditions and can produce immediate or aging degradation of an SSC
surveillance	observation or measurement of condition or functional indicators to verify that an SSC currently can function within acceptance criteria
surveillance requirements	test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within the safety limits, and that the limiting conditions of operation will be met [10 CFR 50.36]

surveillance testing	synonym for surveillance, surveillance requirements, and testing
synergistic effects	portion of changes in characteristics of an SSC produced solely by the interaction of stressors acting simultaneously, as distinguished from changes produced by superposition from each stressor acting independently
* systems, structures, and components (SSCs) important to license renewal	(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 (2) all non-safety-related SSCs whose failure could directly prevent satisfactory accomplishment of any of the required functions identified above (3) all SSCs relied on in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulations for fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout (4) All SSCs subject to operability requirements contained in the facility technical specification limiting conditions for operation (10 CFR 54.3)
testing	observation or measurement of condition indicators under controlled conditions to an SSC currently conforms to acceptance criteria
time in service	time from initial operation of an SSC to a stated time
useful life	synonym for service life
wearout	failure produced by an aging mechanism

APPENDIX C. LIST OF ACRONYMS

ACRS	Advisory Committee on Reactor Safeguards
AEA	Atomic Energy Act of 1954
AHTG	ad hoc technical group
AMIS	aging management information system
ANPR	Advanced Notice of Proposed Rulemaking
ANS	American Nuclear Society
APA	Administrative Procedure Act
APPA	American Public Power Association
ARDM	age-related degradation mechanism
ARDUTLR	age-related degradation unique to license renewal
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without scram
B&WOG	Babcock and Wilcox Owners Group
BWR	boiling water reactor
CFR	Code of Federal Regulations
CLB	current licensing basis
DOE	U. S. Department of Energy
EA	environmental assessment
EDG	emergency diesel generator
EEP	established effective program
EP	effective program (10CFR54)

EPRI	Electric Power Research Institute
EQ	equipment qualification
FSAR	final safety analysis report
GEIS	generic environmental impact statement
GSI	generic safety issue
I&C	instrumentation and control
IEEE	Institute of Electrical and Electronic Engineers
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
IPE	individual plant examination
IPEEE	individual plant examination for external events
ISTM	inspection, surveillance, testing, and monitoring
ITLR	important to license renewal
ITMR	important to maintenance rule
ITPP	important to power production
LCM	life cycle management
LCO	limiting condition for operation
LR	license renewal
NEPA	National Environmental Policy Act
NPAR	Nuclear Plant Aging Research
NPRDS	Nuclear Plant Reliability Data System
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation (branch of NRC)
NUBARG	Nuclear Utility Backfitting and Reform Group

NUMARC	Nuclear Management and Resources Council
NUPLEX	Nuclear Plant Life Extension
O&M	operations and maintenance
OGC	Office of the General Counsel (NRC)
OMB	Office of Management and Budget
OPP	Office of Policy Planning (NRC)
PRA	probabilistic risk assessment
PTS	pressurized thermal shock
PWR	pressurized water reactor
RCS	reactor coolant system
RER	Regulatory Effectiveness Review
SCs	structures and components
SEP	Systematic Evaluation Program
SRP-LR	standard review plan for license renewal
SSCs	systems, structures and components
TBD	to be determined
TIRGALEX	Technical Integration Review Group for the Aging and Life Extension
TRAP	Trip Reduction and Assessment Program (WOG)
USI	unresolved safety issue
WCAP	Westinghouse Commercial Atomic Power (Report prefix)
WOG	Westinghouse Owners Group

APPENDIX D. REVISION RECORD

Date	Description
July 1, 1993	Rev. 0, Initial Issue of the Program Plan

APPENDIX E. BIBLIOGRAPHY

The following list of documents related to the general area of LCM/LR is provided as guidance for persons new to the subjects or desiring the source documents ref ed to elsewhere in this Plan.

1. 10CFR54, "REQUIREMENTS FOR RENEWAL OF OPERATING LICENSES FOR NUCLEAR POWER PLANTS," Federal Register / Vol 56, No. 240 / Friday, December 13, 1991 (Including Statement of Considerations)

2. 10CFR50.65, "REQUIREMENTS FOR MONITORING THE EFFECTIVENESS OF MAINTENANCE AT NUCLEAR POWER PLANTS," Federal Register / Vol 56, No. 132 / Wednesday, July 10, 1991

3. SECY 93-049, IMPLEMENTATION OF 10 CFR PART 54, "REQUIREMENTS FOR RENEWAL OF OPERATING LICENSES FOR NUCLEAR POWER PLANTS," March 1, 1993

4. Memorandum for the Commissioners from NRC General Counsel, License Renewal and SECY 93-049, March 9, 1993

5. SECY 93-113, ADDITIONAL IMPLEMENTATION INFORMATION FOR 10 CFR PART 54, "REQUIREMENTS FOR RENEWAL OF OPERATING LICENSES FOR NUCLEAR POWER PLANTS," April 30, 1993

6. COMSECY 93-029, "Draft Rulemaking on License Renewal (OGC Memorandum of 5/14/93)," J. R. Curtis, May 28, 1993

7. Commission Staff Requirements Memorandum, December 21, 1992, Endorsing the Staff Senior Mangement Review Team and Providing 6 License Renewal Rule Issues to Focus on.

8. WOG Project Authorization, Life Cycle Management / License Renewal, February, 1993

9. WOG/Westinghouse Proposal responding to EPRI RFP3075-7, "License Renewal Technical Demonstration Plants - Resolution of Generic PWR License Renewal Issues," March 12, 1993

10. OPP-92-02, CURRENT LICENSING BASIS FOR OPERATING PLANTS, November 30, 1992

11. NUREG-1412, "Foundation for the Adequacy of the Licensing Basis," (A Supplement to the Statement of Considerations for the Rule on Nuclear Power Plant License Renewal - 10CFR Part 54), December, 1991