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Aging Assessment, Life Extension and License Renewal

THE PLANT HATCH LICENSE RENEWAL PROGRAM

Charles R. Pierce
Southern Nuclear Operating Company
40 Inverness Center Parkway
Birmingham, AL 35201
(205) 992-7872
(205) 992-6108 (fax)
Chuck.R.Pierce@SNC.com

Jon E. Hornbuckle
Southern Nuclear Operating Company
40 Inverness Center Parkway
Birmingham, AL 35201
(205) 992-7974
(205) 992-6108 (fax)
Jon.E.Hornbuckle@SNC.com

Daniel F. Lehnert
LCM Engineering, PLLC
P.O. Box 2580
Southfield, Michigan 48037
(248) 559-7955
248 559 4114 (fax)
DFLehnert@AOL.com

ABSTRACT

A revised license renewal rule was issued in May 1995. It addressed many of the industry's concerns about the stability and practicality of the original rule. The industry's attention since that time has been focused on developing generic industry guidance for implementing the rule and testing the guidance through various demonstration programs and work products in conjunction with the NRC. These activities show that implementation issues continue to exist. Some of the more significant issues deal with the process to demonstrate the effectiveness of existing plant programs and the level of detail that will be required in the license renewal application.

Since the issuance of the rule, the NRC has issued a draft license renewal regulatory guide (RG) and standard review plan (SRP). These documents clarify the NRC's positions on several of the implementation issues and identify several additional issues. Further NRC and industry

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per: W. Burton

interaction will be needed to successfully resolve these issues. The NRC plans to maintain the RG and SRP in draft form until completion of several plant applications' reviews.

Southern Nuclear Operating Company (SNC) has begun development work on a license renewal application for Plant Hatch Units 1 and 2. Plant Hatch Units 1 and 2 are BWR 4, Mark I plants whose operating licenses expire in 2014 and 2018 respectively. Many factors influenced SNC's decision to move ahead with the application development for Plant Hatch at this time. One of these factors was to assure that SNC could continue to play a direct role in contributing to the successful resolution of the RG and SRP issues previously identified. Other factors deal with the length of time required to obtain a renewed license (estimated at about ten years) and the overall financial competitiveness surrounding nuclear power. The "competition issue" is focused on two principal areas. The first area deals with the impact of major capital expenses on a decision to shut down or continue operation toward the end of a nuclear plant's life. The second area deals with the uncertainty of the overall impact of fossil emissions on the cost of fossil generation, and the need to maintain options consistent with changing national policy. SNC will decide on whether to actually submit the application to the NRC when the application is completed.

The Plant Hatch initiative also involves teaming with other BWRs to develop the license renewal technology within the BWR fleet, and to support Plant Hatch by providing an oversight role of application progress. This initiative also involves early interaction with the NRC to address areas of uncertainty in the process. This early interaction is expected to focus on methodology and technical submittals. One of the important areas to be addressed early in the process deals with establishing adequacy of existing programs. Two important programs under consideration for early submittal are the Maintenance Rule structural monitoring program and various Boiling Water Reactor Vessel and Internals Project (BWRVIP) reports.

The BWRVIP was established to address current operating term issues for the BWR reactor vessel and internals; however the BWRVIP recognized that an effective use of technical and licensing resources was to also address the extended operating term. The BWRVIP has prepared an appendix to the inspection and flaw evaluation guidance for each of the vessel internal components that demonstrates how the guidance also addresses the requirements of the license renewal rule. Plant Hatch expects that conducting the NRC reviews of these BWRVIP guidelines for both current and renewal terms at the same time will help to better define the relationships between the current and renewal terms for existing programs under regulatory oversight.

I. INTRODUCTION

Several key developments have occurred with respect to evaluating the benefit of proceeding with the license renewal option. Issuing the Rule and regulatory and industry implementation guidance have been positive developments. National policy decisions may contribute to an improved competitive position for nuclear power. However, there are some significant areas of uncertainty that may affect the reliability of the estimated cost to obtain the renewed license and to implement the licensing commitments during the current and extended operating terms. NRC resource allocation decisions have adversely affected the opportunity for timely generic resolution of the associated process and technical issues through owners' group initiatives and

submittals. For the most part, the NRC is focusing its resources on the review of plant-specific submittals.

These developments, and other factors, have lead SNC to decide to proceed with its license renewal program at Plant Hatch. The program strategies, and participation in teaming relationships, are expected to provide opportunities for early interaction with the NRC. The goal is to resolve, or at least better define, the areas of uncertainty and to assess their impact on the Plant Hatch program.

II. THE RULE AND ISSUES AFFECTING IMPLEMENTATION

In December 1991, the Nuclear Regulatory Commission (NRC) published 10 CFR Part 54 to establish the requirements governing nuclear plant license renewal. In this time period, the industry's initiatives included the license renewal lead plant program, preparation of generic industry reports, addressing the environmental requirements, and other activities sponsored by the Nuclear Energy Institute (NEI), Electric Power Research Institute (EPRI), U.S. Department of Energy (DOE), and the various owners' groups. These actions generally determined that some of the requirements of the rule were not clearly defined and would result in an uncertain regulatory process. The NRC interacted with the industry on these concerns and proceeded to amend the rule. The amended or final license renewal rule was issued in May 1995. It addressed many of the industry's concerns about the practicality of the original rule.

The final rule requires a review of certain plant systems, structures, and components (SSCs) to ultimately determine if the effects of aging are adequately managed for certain structures and components in the period of extended operation. An initial scoping process requires a review of all SSCs to identify those that are within the scope of the rule and their intended functions. An integrated plant assessment process (IPA) is then used to identify those structures and components that require an aging management review (AMR), identify time limited aging analysis (TLAA) issues, perform the AMRs to demonstrate that the affects of aging will be properly managed, and to evaluate the TLAA issues. The purpose of the IPA is to provide reasonable assurance that the structures and components will perform their intended functions consistent with the CLB throughout the extended operating period. Very little is said in the rule about acceptable scoping and IPA methods. The rule requires that the IPA be documented in a license renewal application and submitted to the NRC for review.

Once the final rule was issued, the industry focused their efforts on developing generic industry guidance, NEI 95-10 Revision 0, for implementing the rule. The Owners' Groups developed various generic products in an effort to further understand and define the IPA process and methods for evaluating time-limited aging analyses. In parallel, BG&E and Duke initiated efforts to develop license renewal applications for Calvert Cliffs and Oconee, respectively. Several plants and the NRC participated in an NEI sponsored demonstration of the generic industry guidance. The demonstration program and the process of NRC and industry interaction identified that the generic guidance was workable. However, it also identified that there are several implementation issues that need to be resolved to ensure a stable licensing process and that the associated plant licensing commitments can be implemented in a cost effective manner.

Some of the more significant issues are the need to provide detailed demonstrations of the effectiveness of "all" existing programs, the acceptability of performance and condition monitoring programs for aging management review, and the overall level of detail that will be required in the license renewal application.

The NRC subsequently issued a draft regulatory guide (RG) and standard review plan (SRP) that, for the most part, adopts the industry guidance, clarifies their position on several of the implementation issues, and exposes several additional issues. Further NRC and industry interaction will be needed to successfully resolve these issues and the issues identified during the demonstration program. The NRC plans to maintain the RG and SRP in a draft form until it has completed the review of several plant unique applications. These documents will then be completed using the lessons learned from these reviews. This would be a reasonable approach, but unfortunately the NRC License Renewal Directorate announced that they would focus there resources on the review of plant-unique applications. Very little, if any, resources would be applied to the review of Owners' Group or other generic products/documents. Therefore, there is a concern that industry-wide participation and considerations in the final resolution of the implementation issues may be very limited.

III. THE STRATEGY AND PROGRAM FOR HATCH

SNC has been involved in license renewal throughout the rule making process and during the development of the generic implementation guidance. Plant Hatch was one of the sites that participated in the NEI sponsored demonstration of the generic industry guidance. SNC strategic evaluations have periodically assessed the costs and benefits of extended operating scenarios for Plant Hatch. These evaluations have shown that the overall financial competitiveness surrounding nuclear power is focused on two principal areas.

The first area deals with the impact of major capital expenses on a decision to shut down or continue operation toward the end of a nuclear plant's life. At any time, a major capital expense could become necessary to continue operation. Late in plant life, such an expense could result in a decision to shutdown rather than incur the expense. License renewal extends the time available to recover such an expense and thereby improves the probability that such an expense will not force the plant to shutdown.

The second area deals with the uncertainty of the overall impact of fossil emissions on the cost of fossil generation, and the need to maintain options consistent with changing national policy. The recent treaty in Kyoto, if ratified, requires the U.S. to reduce greenhouse emissions to 7% below 1990 levels between 2008 and 2012. The Department of Energy (DOE) estimates a $50/ton tax will be needed to establish 1990 CO_2 levels, which generally translates into an average 1.00 cent/KWH increased cost for fossil plants. Obviously, added costs would be even higher to get emissions to 7% below 1990 levels. Since nuclear power plants produce no greenhouse emissions, renewal of existing nuclear plants could be a vitally important option for maintaining generation capacities and meeting national emission standards of the future.

Plant Hatch Units 1 and 2 are BWR 4, Mark I plants whose operating licenses expire in 2014 and

2018 respectively. SNC has decided to move ahead with the preparation of a license renewal application for Plant Hatch. The main reason is to assure that SNC can continue to play a direct role in contributing to the successful resolution of the RG and SRP issues previously identified. Because the NRC is currently giving priority to plant specific documents over owner's group submittals, this is the best means SNC has to influence the outcome. Other factors that influenced SNC's decision included the above competitive issues and the length of time required to obtain a renewed license, which is estimated at about ten years. In addition, nuclear power needs assurance there will be a nuclear power future in order to attract talented workforce replacements. Finally, the license renewal process needs to be exercised to achieve stability and predictability.

The Plant Hatch license renewal program is a multi-year program with a goal of having a renewal application ready for submittal by the end of 1999. During the preparation of the application, SNC plans to solicit the NRC's review of several documents addressing key process or technical issues. SNC will decide on whether to submit the application once it is completed.

Activities leading to the development of the plant-specific process and procedural documents are nearly complete. Scoping and screening activities are also proceeding. Completing the IPA and TLAA evaluations for the major plant structures and components is planned for 1998.

IV. TEAMING INITIATIVES

Resolution of the significant implementation issues may affect all plants. They will certainly affect those plants that elect to preserve the license renewal option. Their confidence that license renewal can be a cost-effective option may be eroded if these issues are not favorably resolved. There is also a concern that the resolution of some of these issues could affect current term operating practices, whether or not the plant is pursuing an extended operating license. Therefore it is important that the NRC be presented with a variety of viable implementation approaches. This will ensure that the issue resolutions do not foreclose any practical approaches that satisfy the requirements of the rule and streamline the process based on industry experience or plant-specific considerations. SNC believes there is a relatively small window of opportunity for influencing the NRC's final resolution of the implementation issues. Therefore, a short-term approach of preparing technical reports that address selected implementation topics/issues is needed to allow the NRC to review and understand the basis and merits of alternate approaches/positions.

To address this situation, SNC has initiated a teaming relationship with several other utilities with BWR plants. The following areas of common ground, shared points of view, and/or issues of concern provided the reasons for these utilities to participate in a license renewal-teaming program.

- Each of the utilities have BWR plants.
- There is some level of safety/benefit of more than one BWR proceeding concurrently with license renewal; especially during the licensing review process.
- Teaming provides each utility a measure of assurance that their programs, procedures,

and/or positions are on the right track.

- The utilities have a common philosophy on the important implementation issues.
- The window of opportunity to influence the implementation process is rapidly closing.
- Teaming should provide an opportunity to reduce costs.
- Teaming provides opportunities for meaningful mentoring support.
- A plant specific versus a generic approach/submittal is required to obtain NRC resources.
- Having a history of good performance (plant/regulatory) is essential for license renewal to be a cost-effective option.
- Nuclear is part of the long-term strategy for each of the utilities.

It is recognized that establishing a consensus between the team members on the implementation "details" will require patience and determination. However, it is also recognized by each of the utilities that there is significant benefit in early and broader interaction with the NRC to address the areas of uncertainty. In this context, it was agreed that the goals of the teaming effort should include the following:

- Work to favorably influence the NRC's positions and decision making process with respect to implementing the license renewal rule.
- Work to reduce the costs to prepare the license renewal application and for the NRC's review.
- Ensure that the license renewal applications of the participating utilities could be submitted ahead of the "pack."
- Establish a success path (standard) for other BWRs to follow.
- Apply strategies that reduce the potential for public intervention.
- Promote wider industry involvement.

A full commitment by each of the utilities to proceed in parallel to prepare and submit license renewal applications would be the strongest approach. However, a two phased approach was determined to be the most viable approach. The first phase would be to select structure and component topics that involve important implementation issues and then to work in a collaborative manner to submit application material for each plant on these topics. The second phase would be to prepare and submit a full application. Each utility could do this on their own schedule. The fact that three utilities would commit to submit material on their own docket was believed to be a strong selling point with the NRC.

Other than recognizing plant unique features and commitments, each utility agreed to produce products that are essentially the same. This would include the processes at the various steps of the scoping, screening and IPA results, programs credited in the aging management reviews, TLAA issues and evaluation approach, and treatment of industry issues. The reactor recirculation piping, pumps and valves; standby liquid control system; and intake structure were targeted for the accelerated aging management reviews and the development of "application equivalent" reports that can be submitted for review by the NRC. It is intended that these reports provide pattern documents that can be "directly" used by other team members and BWRs. Each plant would insert their plant specific data, however they would use the pattern document's approach for addressing the process and technical issues.

V. USE OF EXISTING PROGRAMS: THE MAINTENANCE RULE AND BWRVIP

Compliance with regulatory and/or code requirements is the basis for many of the current plant maintenance programs for structures and components within the scope of the license renewal rule. Other programs have evolved through significant industry efforts to resolve operating experience issues. The objectives, scope and procedures for these programs typically focus on establishing the current condition of the structure or component and providing information for timely corrective action, when necessary. An important point is that the basis and content (techniques, processes, etc.) of these types of programs is independent of the period of operation. Therefore, the need to demonstrate that these programs are effective in a license renewal application is not purposeful. The exercise would only result in "re-presenting" information the NRC has already reviewed and accepted as part of the resolution of, or compliance with, an associated regulatory issue/requirement. The more practical and meaningful approach would be just listing these types of programs in the application with a discussion showing that the program manages the aging effect. A commitment would then be made to continue these programs through out the extended operating period.

Two examples of these types of programs are: (1) the structural monitoring program that results from compliance with Maintenance Rule, and (2) the application of the BWR Vessel Internals Program (VIP) inspection guidance.

The Plant Hatch structural monitoring program that was established for compliance with the Maintenance Rule has evolved into a "full scope" condition-monitoring program. Qualified personnel perform comprehensive, walk-downs of structures to record, categorize and disposition the observed conditions. Periodic inspections performed as part of previously existing programs (e.g., structures settlement monitoring, soil and ground water analysis, buried component assessment, ASME Section IWE, etc.) are also made part of the overall structural monitoring program. The information is recorded in a manner to facilitate ongoing monitoring. Industry and regulatory guidance has been adopted to provide substantial direction with regard to relevant aging effects, susceptible locations, manifestations and precursors to recognize deterioration and grade the as-found conditions. Acceptance criteria are established and used in the grading of the structures and to determine when it is necessary to establish goals to restore the condition of a structure. The NRC has reviewed the program as part of their baseline maintenance rule compliance inspections. Guidance has also been provided to the resident and region-based inspectors for their ongoing verifications. Therefore, in view of these considerations, utilities should only have to commit to continue the structural monitoring program as the basis for providing reasonable assurance that aging will not prevent the structures from performing their intended functions. SNC believes that no new programs or significant enhancements to the current program for Plant Hatch will be necessary. SNC expects to use the review of the intake structure, as part of the teaming program, to establish that this approach complies with the requirements of the license renewal rule.

The BWRVIP is developing a comprehensive program that allows utilities with BWR plants to manage degradation associated with the reactor vessel and internals components. Cost-effective

evaluation methodologies, inspection techniques and repair alternatives are being defined and qualified. Each operating plant can select the appropriate alternative. It has been recognized by the industry that the goals, scope of evaluations and inspection requirements established by the BWRVIP also apply to the extended operating period. A license renewal appendix has been developed for each of the vessel internal, component groupings. The appendix demonstrates how the inspection guidance complies with the License Renewal Rule. In most cases, this involves continued use of the current operating term techniques. In a few cases, the analysis developed by the BWRVIP was based on 40-year time limited assumptions and it was necessary to demonstrate that these analyses could be extended to 60 years. The appendix also identifies any issues requiring plant-specific reviews or evaluations. Full acceptance by the NRC of this approach is needed in the near term. It would not be cost effective for SNC to provide a plant-specific demonstration that the generic inspection guidance will provide reasonable assurance that the affects of aging are effectively managed for the renewal term. The technical resources that are currently working on the BWRVIP can effectively disposition the issues affecting the acceptance of the generic guidance for license renewal. Near-term application of these license renewal appendices is planned for Plant Hatch. This will facilitate early interaction with the NRC and timely identification and assessment of the potential impact of any compliance issues.

VI. CONCLUSION

SNC has decided to proceed with developing a license renewal application for Plant Hatch. The final decision on whether to submit the application will be made once the application is completed. The program strategies, and participation in teaming relationships, are expected to provide opportunities for early interaction with the NRC. The goal is to resolve the areas of uncertainty affecting implementation of the license renewal rule and to assess the impact of the resolutions on the Plant Hatch program. The Plant Hatch teaming initiatives will also provide license renewal technology to the BWR fleet, and serve to provide an oversight role during the implementation of the Plant Hatch program.

Plant Hatch
License Renewal Application

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Agenda

- Introduction
- Background and Objective
- Plant Hatch License Renewal Project Overview
- License Renewal Application Contents

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Introduction

Who we are -

- SNC is a wholly-owned subsidiary of Southern Company, the largest producer of electricity in the U.S.
- The licensee operator and agent for the owners of Plants Farley, Hatch, and Vogtle

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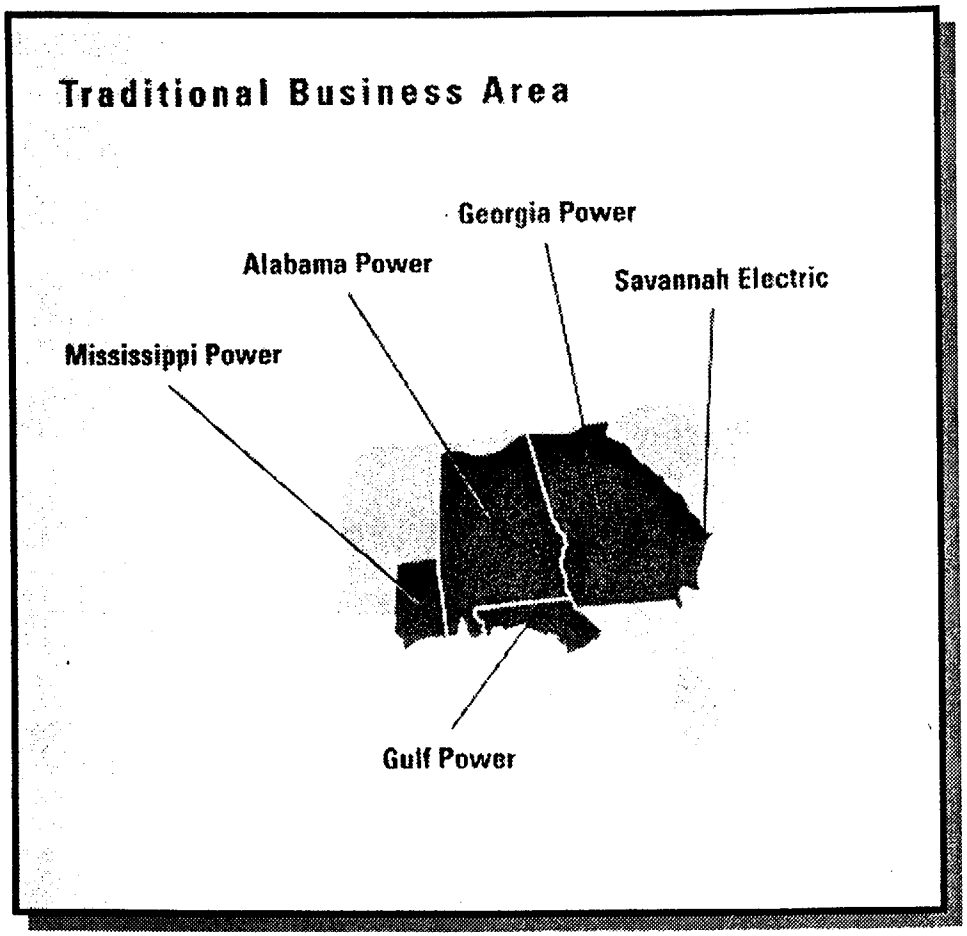
Introduction



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Introduction

Our industry participation -

- **SNC has maintained participation in BWR Owners Group license renewal activities since 1989 and WOG license renewal activities since 1992**
- **SNC participates in the NEI and EPRI License Renewal efforts**
  - *Ongoing activities include resolving generic license renewal issues, work on revising NEI 95-10 (industry guidance for license renewal), input to update of the Standard Review Plan, the GALL report, etc.*

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Introduction

Utilize monthly management meetings to maintain SNC and NRC focus on process

- **Continue meetings similar to the Calvert Cliffs/NRC meetings to**
  - *brief NRC line management on progress of license renewal application review*
  - *determine if any issues need elevating to NRC Steering Committee by SNC or NRC*
  - *establish performance indicators for next review meeting, such as schedule adherance, quality of work, communications, regulatory stability, accomplishments, and concerns*

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Background, Objective and Project Overview

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Background

- *Unit 1's current license expires in August 2014*
- *Unit 2's current license expires in June 2018*
- *10 CFR 54 allows the issuance of a renewed license for an additional 20 years*
- *SNC plans to request renewal of the licenses by filing an application in February 2000*
- *When approved, the renewed licenses would allow continued operation until August 2034 and June 2038 for Units 1 and 2 respectively*

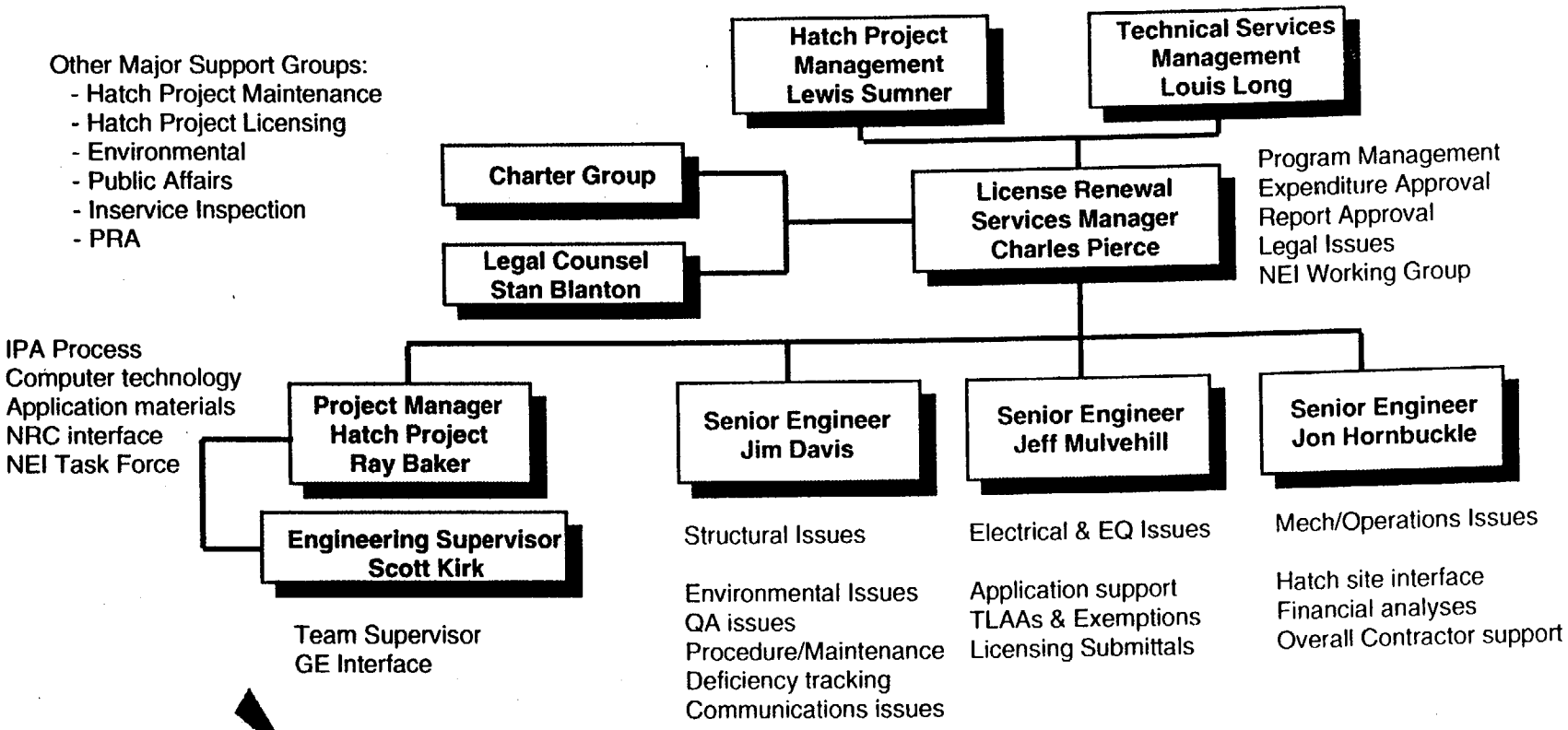
Objective

Obtain a renewed license for Plant Hatch in a timely and efficient manner based on:

- Utilize the generic and relevant information from the BWRVIP Topical Reports
- Implementing relevant lessons learned from the Calvert Cliffs and Oconee application review process
- Improved guidance resulting from the Calvert Cliffs and Oconee experience
- Coordinating with NRC to help ensure the Hatch application preparation and review process are effective, efficient, timely, and predictable

Project Overview

Our project organization -



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Project Overview

Application Approach -

- Participated in NEI/EPRI issue resolution and incorporated relevant results
- Monitored Calvert Cliffs and Oconee interactions with the NRC & incorporated relevant information
- Used NRC's new standard format for the preparation of the Hatch Application
- Conducted peer reviews of two drafts of the application and incorporated input

Project Overview

Assembling the application - what we did -

- **Provided general information pursuant to §54.19**
  - *General information specified in 10 CFR 50.33(a) - (e), (h), and (i) {§54.19(a)}*
  - *Included conforming changes to the standard indemnity agreement to account for the expiration term of the proposed renewed license {§54.19(b)}*

Project Overview

Assembling the application - what we did -

- **Performed an Integrated Plant Assessment pursuant to §54.21(a)**
  - *Identified and listed structures and components that are subject to an aging management review per §54.4(a) {§54.21(a)(1)}*
  - *Described and justified the scoping and screening methodology used to identify and list {§54.21(a)(2)}*
  - *Demonstrated for each structure and component subject to aging management review, that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation {§54.21(a)(3)}*

Project Overview

Assembling the application - what we did -

- **Evaluated Time-Limited Aging Analyses (TLAAs) pursuant to §54.21(c)**
  - *Identified and listed calculations and analyses that meet the criteria for TLAAs and dispositioned the TLAAs per one of the three demonstrations of §54.21(c)(1)(i)-(iii)*
  - *Identified and listed plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses {§54.21(c)(2)} --- there were none*

Project Overview

Assembling the application - what we did -

- **Produced an FSAR supplement pursuant to §54.21(d)**
  - *Provided summary descriptions of programs and activities for managing the effects of aging*
  - *Provided a summary of the evaluations of TLAAs for the period of extended operation*
- **Provided Technical Specifications changes for the renewal term pursuant to §54.22**
- **Produced an Environmental Report Supplement to comply with 10 CFR Part 51 pursuant to §54.23**

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Project Overview

SNC Process -

— Integrated Plant Assessment - Scoping

- *SNC developed a comprehensive list of systems and structures and identified functions for each item on the list*
- *Each function was evaluated against the eight scoping criteria in 10 CFR 54.4(a)(1-3)*

— Integrated Plant Assessment - Screening

- *As an aid to screening the structures and components, evaluation boundaries were produced for each in-scope function*
- *Structures and components within the evaluation boundaries were screened to identify those subject to aging management review*
- *The screening criteria used were those contained in 10 CFR 54.21(a)(1)(i) and (ii)*

Project Overview

SNC Process -

– Integrated Plant Assessment - Aging Management Reviews

- *Each structure or component subject to aging management review is included in one or more in-house reviews*
- *Aging management reviews were performed on a commodity basis (discussion of commodity groups follows)*
- *Aging effects requiring management were determined systematically for the commodity groups based on materials and environments*
- *Appropriate program coverage for the structures or components comprising each commodity group was identified or established*
- *The commodity group/programmatic coverage mapping process is similar to the approach in the GALL report*

Project Overview

SNC Process -

– Integrated Plant Assessment - Aging Management Reviews

- *Plant operating experience was reviewed to validate the determination of aging effects requiring management and as an aid to identify potential enhancement areas*
- *Aging management reviews were summarized into the application (some grouping of AMRs)*
- *The demonstration of adequate aging management is made for each commodity group*

Project Overview

SNC Process -

— Time Limited Aging Analyses

- *SNC created a list of calculations (in-house and A/E) to encompass those with a time-limited nature*
- *NSSS vendor was contacted separately to review their scope for TLAAs*
- *An initial screening was performed using criterion 3 - the time-limited nature of the calculation*
- *The remaining set of calculations was then screened using the remaining 5 criteria*
- *Both "actives" and "passives" were screened*
- *Separately, a CLB review was performed to assure a thorough review to identify potential TLAAs*

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Project Overview

SNC Process -

– GSI's Addressed in Plant Hatch Application

- *GSI 168 - Environmental Qualification of Electrical Equipment*

  EQ evaluations of electrical equipment are TLAAs. Therefore, this GSI is addressed in Section 4.4 of the Plant Hatch application.

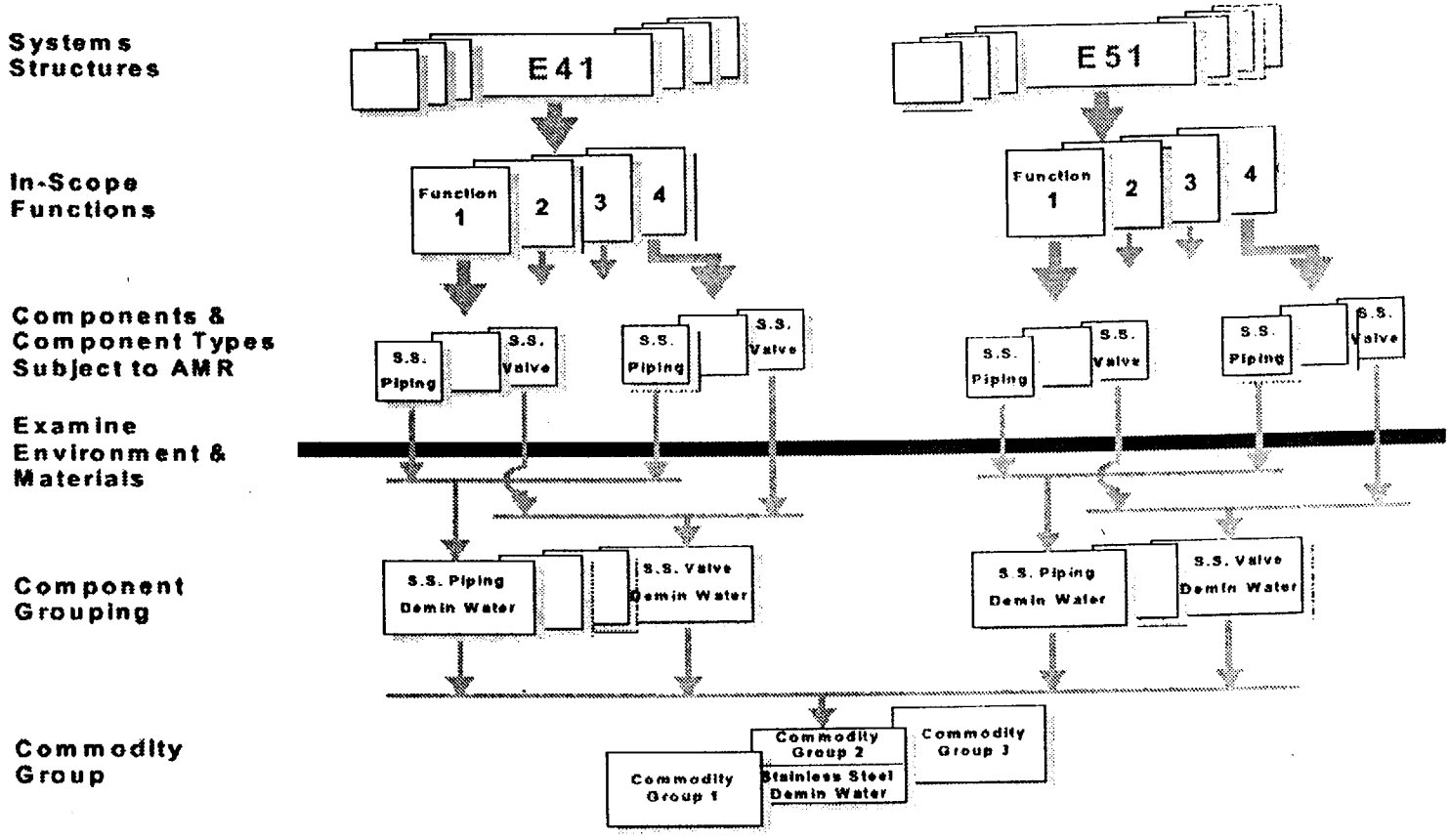
- *GSI 190 - Fatigue Evaluation of Metal Components*

  A number of thermal fatigue evaluations are TLAAs. Therefore, the issue associated with this GSI is addressed in Section 4.2 of the Plant Hatch application.

Project Overview

SNC Process -

- *Component groups to commodity groups*



Application Contents

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Application Contents

- **License Renewal Application Contents**
  - **General Information (section 1)**
  - **Structures and Components Requiring an Aging Management Review (section 2)**
    - *Methodology for scoping and screening*
    - *Identification of structures and components subject to aging management review (scoping/screening results)*
  - **Aging Management Review Results (section 3)**
    - *Discussion of process for merging component groups into commodities*
    - *Discussion of aging management review process*

Application Contents

- **License Renewal Application Contents (continued)**
  - **Aging Management Review Results (section 3, contiuned)**
    - *Six-column tables (general overview of aging management reviews results - component types, materials, environments, aging effects requiring management, programs and activities credited)*
  - **Time-Limited Aging Analyses (section 4)**
    - *Exemptions adddressed (none)*

Application Contents

- **License Renewal Application Contents (continued)**
  - **Final Safety Analysis Report Supplement (appendix A)**
    - *Descriptions of programs and activities for managing aging are contained in appendices A*
  - **Identification of Aging Effects and Aging Management Review Summaries (appendix C)**
    - *C.1 presents an evaluation of aging effects requiring management*
    - *C.2 presents the summaries of the aging management reviews*
    - *The demonstrations are made in C.2, including the linkage of programs and activities to management of aging effects*

Application Contents

- **License Renewal Application Contents (continued)**
  - **Environmental Report Supplement (appendix D)**
  - **Technical Specification Changes (appendix E)**
    - *Pressure-temperature curve changes to extend operation through 54 effective full-power years*

Aging Management Reviews

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Aging Management Reviews

- **Systematically identified aging effects requiring management for the following component internal environments:**
  - *Reactor grade water*
  - *Demineralized water*
  - *Suppression Pool water*
  - *Spent Fuel Pool water*
  - *Borated water*
  - *Closed cooling water*
  - *Raw water*
  - *Fuel oil*
  - *Gas*

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Aging Management Reviews

- ***Systematically identified aging effects requiring management for the following component external environments:***
  - *Inside*
  - *Outside*
  - *Buried or Embedded*

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Aging Management Reviews

- ***Systematically identified aging effects requiring management for the following structure environments:***
  - *Inside*
  - *Outside*
  - *Buried or Embedded*
  - *Submerged*

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Aging Management Reviews

- ***Systematically identified aging effects requiring management for the following electrical component environments:***
  - *High temperature*
  - *Radiation*
  - *Moisture*

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Aging Management Reviews

- ***Total of 58 AMR summaries are provided in the application and summarize 111 AMRs***
  - *45 mechanical*
  - *5 electrical*
  - *8 civil/structural*
- ***EQ TLAAs manage the vast majority of electrical components subject to aging management review***
- ***Thermal fatigue is managed by combinations of TLAAs and aging management programs***

Aging Management Reviews

– Mechanical AMR Summaries

- *45 mechanical AMR summaries*
- *6 mechanical Class 1 AMR summaries are supported by 7 AMRs on-site*
- *28 mechanical non-Class 1 AMR summaries are supported by 91 AMRs on-site*
- *6 mechanical non-Class 1 AMR summaries address fire protection components and are supported by 42 AMRs on-site*
- *3 mechanical AMR summaries address external surfaces*
- *2 AMR summary addresses thermal insulation and jacketing*

Aging Management Reviews

- **Electrical AMR Summaries**
  - *5 electrical AMR summaries for electrical components are provided, supported by 5 in-house AMRs*
  - *only 1 electrical AMR summary addresses an aging effect requiring management outside EQ*

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Aging Management Reviews

- ***Civil/Structural AMR Summaries***
  - *8 civil/structural AMR summaries are provided, supported by 8 in-house AMRs*

AMR Summaries

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6 Class 1 Mechanical AMR Summaries

1. Reactor Pressure Vessel
2. Reactor Pressure Vessel Internals
3. Class 1 Carbon Steel Components Within the Reactor Water Environment
4. Class 1 Wrought and Forged Stainless Steel Components Within the Reactor Water Environment
5. Class 1 Cast Austenitic Stainless Steel Components Within the Reactor Water Environment
6. Class 1 Pressure Boundary Bolting

39 non-Class 1 Mechanical AMR Summaries

1. Carbon Steel Components Within the Reactor Water Environment
2. Stainless Steel Components Within the Reactor Water Environment
3. Carbon Steel Components Within the Demineralized Water Environment
4. Stainless Steel Components Within the Demineralized Water Environment
5. Condensate Storage Tanks
6. Carbon Steel Components Within the Suppression Pool Environment
7. Stainless Steel Components Within the Suppression Pool Environment
8. Carbon Steel Components Within the Borated Water Environment
9. Stainless Steel Components Within the Borated Water Environment
10. Carbon Steel Components Within the Closed Cooling Water Environment
11. Stainless Steel Components Within the Closed Cooling Water Environment
12. Copper Alloy Components Within the Closed Cooling Water Environment

39 non-Class 1 Mechanical AMR Summaries (cont'd.)

13. Carbon Steel Components Within the River Water Environment
14. Stainless Steel Components Within the River Water Environment
15. Copper Alloy Components Within the River Water Environment
16. Gray Cast Iron Components Within the River Water Environment
17. Carbon Steel Components Within the Fuel Oil Environment
18. Stainless Steel Components Within the Fuel Oil Environment
19. Carbon Steel Components Within the Dry Compressed Gas Environment
20. Stainless Steel Components Within the Dry Compressed Gas Environment
21. Copper Alloy Components Within the Dry Compressed Gas Environment
22. Carbon Steel Components Within the Humid or Wetted Gas Environment
23. Stainless Steel Components Within the Humid or Wetted Gas Environment
24. Copper Alloy Components Within the Humid or Wetted Gas Environment

39 non-Class 1 Mechanical AMR Summaries (cont'd.)

25. Galvanized Carbon Steel Components Within the Humid or Wetted Gas Environment
26. Carbon Steel Bolting Materials
27. Stainless Steel Bolting Materials
28. Residual Heat Removal Heat Exchangers
29. Water Based Fire Suppression Systems
30. Fire Protection Diesel Fuel Oil Supply System
31. Compressed Gas Based Fire Suppression Systems
32. Fire Penetration Seals
33. Cable Tray Fire Barriers
34. Fire Doors

39 non-Class 1 Mechanical AMR Summaries (cont'd.)

35. Commodity External Surfaces Exposed to an "Inside" Environment
36. Commodity External Surfaces Exposed to an "Outside" Environment
37. Commodity External Surfaces Exposed to a "Buried" or "Embedded" Environment
38. Thermal Insulation
39. Metal Jacketing for Thermal Insulation

8 Structural AMRs

1. Concrete Structures
2. Steel Primary Containment and Internals
3. Steel Structures in Seismic Category I Buildings, the Turbine Building, and Category I Yard Structures
4. Component Supports
5. Spent Fuel Pool Liner, Components, and Racks
6. Aluminum
7. Structural Sealants
8. Tornado Relief Vent Assemblies

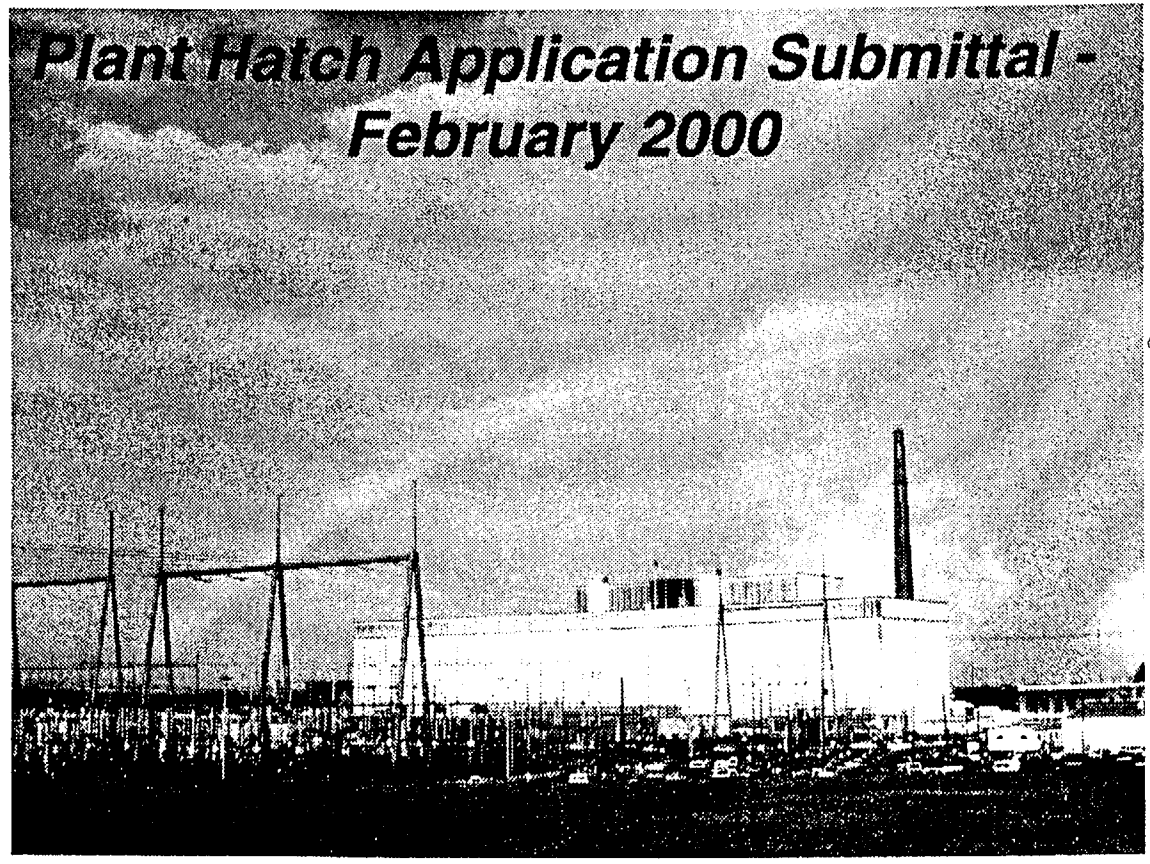
5 Electrical AMR Summaries

1. Phase Bussing
2. Nelson Frames
3. Electrical Splices, Connectors, and Terminal Blocks
4. Insulated Electrical Cable Outside Containment
5. Insulated Electrical Cable - Containment

BWRVIP Reports

- BWRVIP-74 Reactor Pressure Vessel Inspections and Flaw Evaluation Guidelines
- BWRVIP-27 SLC/Core Plate delta-P Inspection and Flaw Evaluation Guidelines
- BWRVIP-38 Shroud Support Inspection and Flaw Evaluation Guidelines
- BWRVIP-41 Jet Pump Assembly Inspection and Flaw Evaluation Guidelines
- BWRVIP-48 Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines
- BWRVIP-76 Core Shroud Inspection and Flaw Evaluation Guidelines
- BWRVIP-18 Core Spray Internals and Flaw Evaluation Guidelines
- BWRVIP-26 Top Guide Inspection and Flaw Evaluation Guidelines
- BWRVIP-47 Lower Plenum Inspection and Flaw Evaluation Guidelines

Conclusion



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Applicant's Environmental Report - Operating License Renewal Stage

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February 10, 2000

Southern Nuclear Operation Company

SOUTHERN COMPANY

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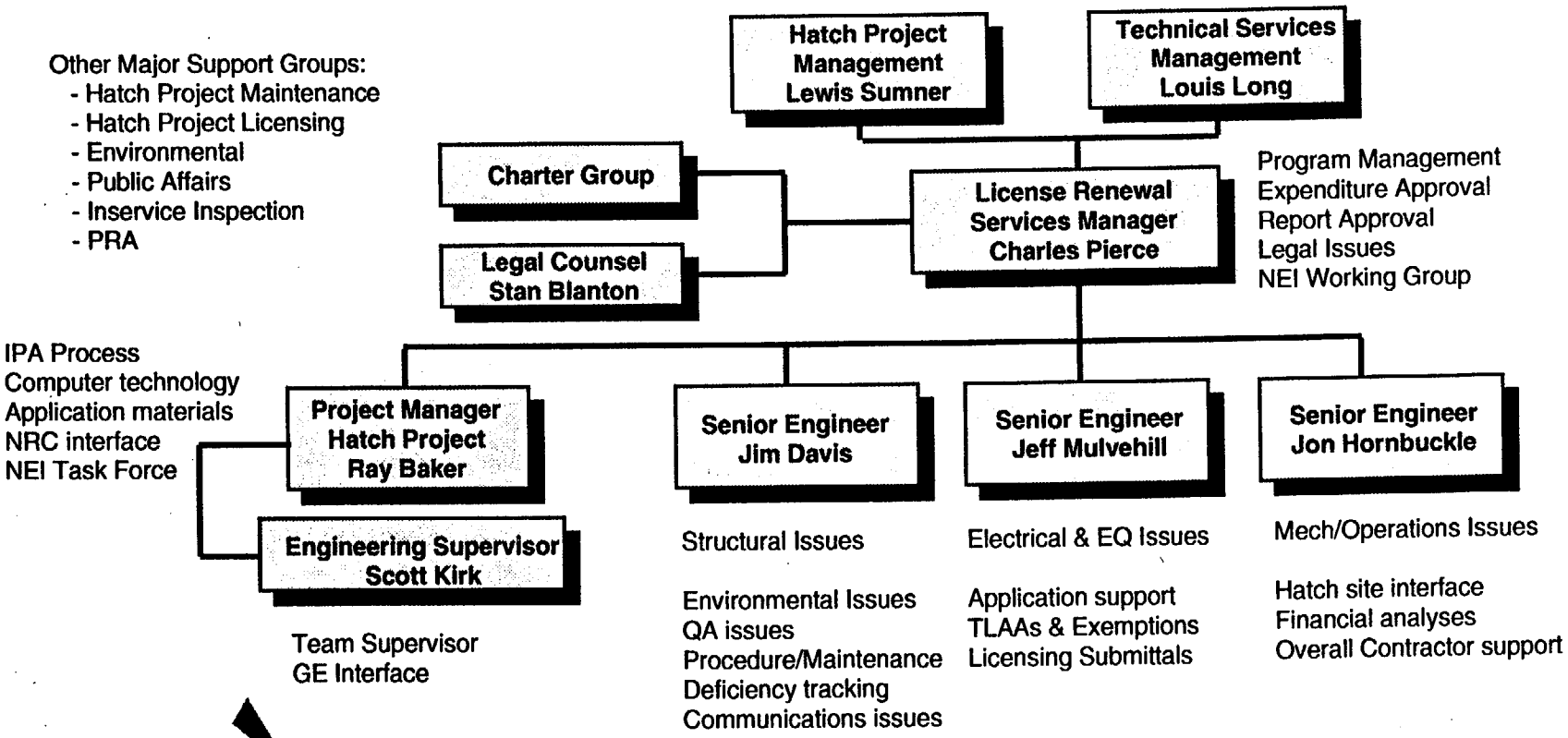
Project Overview

Our project organization -



SOUTHERN COMPANY

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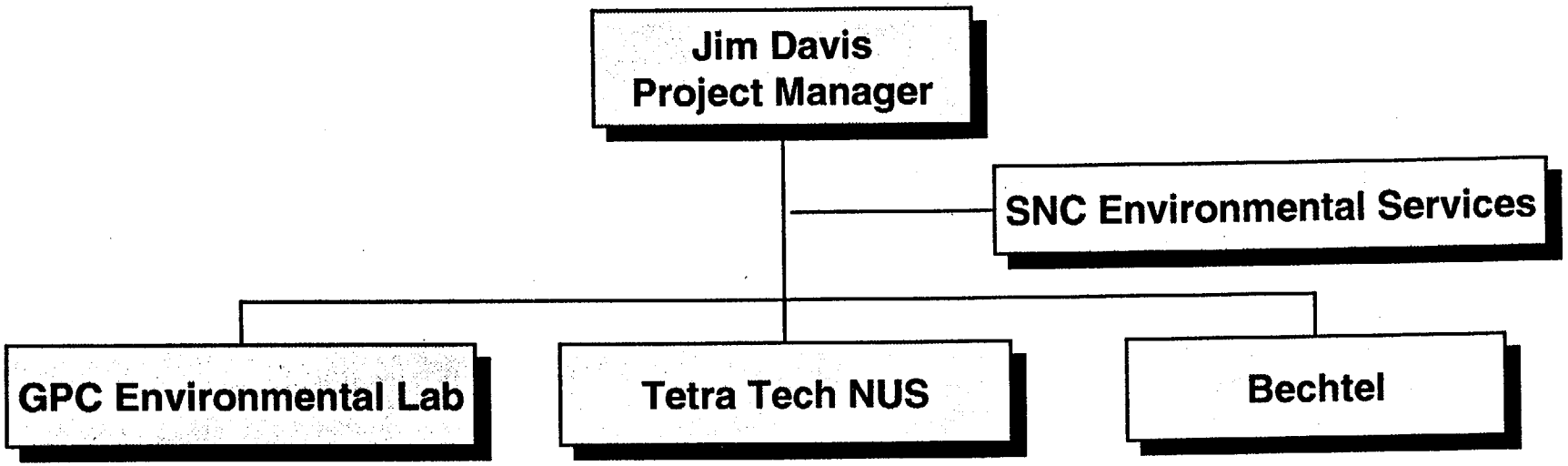
Environmental Report



Field Survey Oversight
Environmental Assessments
Environmental Research
ER Consultant

Primary Contractor
Environmental Report
Environmental Assessments
Environmental Research
SAMA Analysis

SAMA Research
SAMA Candidates
SAMA Design Description
SAMA Cost Estimates

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Environmental Report

- **Format of Environmental Report (ER)**
  - Format of the ER is similar to the Calvert Cliffs ER
  - Section 1.0 - Introduction
  - Section 2.0 - Proposed Action and Alternatives
  - Section 3.0 - Environmental Consequences and Mitigating Actions
  - Section 4.0 - Compliance Status
  - Section 5.0 - References

Environmental Report

- **General Description of the Site**
  - Located in Appling County approximately 67 miles southwest of Savannah, Georgia
  - Site consists of 2240 acres
  - Closed loop cooling system
  - Population estimates within 80-km (50-mile radius) obtained using SECPOP90

Environmental Report

- **Evaluation of the Category 2 Issues**
  - Twenty-one Category 2 issues identified by GEIS
  - Five of the twenty-one requirements not applicable to HNP site
    - Entrainment of fish and shellfish in early life stages (once-through cooling)
    - Impingement of fish and shellfish (once-through cooling)
    - Heat shock (once-through cooling)
    - Groundwater use conflicts (Ranney wells)
    - Groundwater quality degradation (cooling ponds)
- **Sixteen Category 2 issues and Environmental Justice addressed in ER**

Environmental Report

- **Surface Water Use**
  - Altamaha river annual flow rate less than 3.15×10^{12} ft^3/year
  - HNP withdraws annual avg. of ~ 57 MGD
  - HNP returns ~ 25 MGD
  - Consumptive loss 0.44 - 3.1 % of river flow
  - Impacts small
  - GADNR concurred

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Environmental Report

- **Groundwater Use**
  - HNP pumps more than 100 gallons per minute
  - GADNR permit for four wells at 764 gpm
  - 3 wells installed averaging ~ 126 gpm
  - Nearest appreciable demand is 10 miles south of site
  - Groundwater pump tests determined draw down would not extend to the facility boundary

Environmental Report

- **Terrestrial Resources**
  - SNC has no plans to perform major refurbishment activities
  - No impacts to terrestrial resources

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Environmental Report

- **Threatened and Endangered (T&E) Species**
  - No significant refurbishment activities required for license renewal
  - USFWS & NMFS consulted for T&E Federally-listed species
  - GADNR consulted for T&E State-listed species
  - Environmental field survey performed on the plant site and transmission corridors
  - Mussel survey performed in Altamaha

Environmental Report

• Threatened and Endangered (T&E) Species

Table 3-2. Listed[1] species known to occur in the vicinity of HNP or in associated rights-of-way.

Common Name	Scientific Name	Federal Status	State Status	Source
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	Reference 5
Eastern indigo snake	*Drymarchon corais couperi*	Threatened	Threatened	Reference 55
Gopher tortoise	*Gopherus polyphemus*	---	Threatened	References 5, 55
American alligator	*Alligator mississippiensis*	Threatened (S/A)	---	References 3, 55
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Endangered	(a)
Wood stork	*Mycteria americana*	Endangered	Endangered	Reference 55
Bachman's sparrow	*Aimophila aestivalis*	---	Rare	Reference 55
Purple honeycomb head	*Balduina atropurpurea*	---	Rare	Reference 65
Cutleaf beardtongue	*Penstemon dissectus*	---	Threatened	Reference 65
Parrot pitcher plant	*Sarracenia psittacina*	---	Threatened	Reference 65
Sandhill golden-aster	*Pityopsis pinifolia*	---	Threatened	(b)
Hairy rattleweed	*Baptisia arachnifera*	---	Endangered	(b)

a. Observed by Georgia Power Company biologists.
b. GNHP
1. Species that USFWS in NMFS has listed or proposed for listing as threatened or endangered; species that GADNR has listed or proposed for listing as rare, threatened, or endangered.

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Environmental Report

- **Air Quality**
  - HNP located in counties classified as attainment for all criteria pollutants
  - Nearest nonattainment area is 140 miles northwest of HNP
  - SNC has no plans to perform major refurbishment activities
  - No impact to air quality

Environmental Report

- **Microbiological (Thermophilic) Organisms**
  - HNP discharges in a river with annual flow rate less than 3.15×10^{12} ft^3/year
  - GADNR EPD consulted, no known presence in Altamaha
  - HNP discharge would not promote growth
  - No impact to public health
- **Electrical Shock**
  - Description of transmission lines (500 kV and 230 kV lines)
  - 500 kV and 230 kV lines evaluated per NESC for ground clearance
  - Both under NESC 5 mA requirement (ENVIRO)

Environmental Report

- Housing Impacts
- Public Services, Education
- Public Services, Utilities
- Public Services, Transportation
  - SNC has no plans to perform major refurbishment activities
  - SNC strategic plan does not anticipate an increase workers
  - SNC assumed 60 additional workers for the renewal term for bounding analysis
  - bounding analysis show no socioeconomic impacts

Environmental Report

- **Offsite Land Use, Refurbishment**
- **Offsite Land Use, License Renewal Term**
  - **SNC has no plans to perform major refurbishment activities**
  - **SNC assumed 60 additional workers for the renewal term for bounding analysis**
  - **Population-related impacts - small**
  - **Tax-revenue impacts**
    - **Currently ~ 70% of Appling County tax base**
    - **No increase anticipated since no refurbishment improvements planned**

Environmental Report

- **Historic and Archaeological Resources**
  - HNP has no historic or archaeological properties within a 10 mile radius
  - No major construction planned for license renewal period
  - GADNR Historic Preservation Division concurs

Environmental Report

- **Severe Accident Mitigation Analysis (SAMA)**
  - Methodology based on "Regulatory Analysis Technical Evaluation Handbook", NUREG/BR-0184, January 1997
  - Developed a bounding analysis that reduced risk to "0"
  - Analysis demonstrated that any modification greater than $500,000 are not cost justified
  - Onsite costs and replacement power were included in analysis

Environmental Report

Severe Accident Mitigation Analysis (SAMA)

- **Candidate Screening Process**
  - Initial list of 115 SAMA candidates
  - 16 were already in place at HNP
  - 46 were not applicable or risk significant to BWR design
  - 10 were combined with other similar modifications
  - 43 unique SAMA candidates with potential value remained
  - Preliminary cost estimates were developed for 43
  - These were screened to $500,000
  - 16 remained for more detailed analysis

Environmental Report

Severe Accident Mitigation Analysis (SAMA)

- **16 Remaining SAMA Candidates**
  - A more detailed conceptual design and cost analysis was developed
  - Level II analysis determined 5 SAMAs were currently adequately covered by plant design and procedures
  - One SAMA was found to be greater than $500,000
  - The remaining ten were analyzed
  - Greatest single SAMA benefit was ~ $2500 with a cost of $100,000 (per unit)
  - None of the SAMAs analyzed were cost justified

Environmental Report

- **New and Significant Information**
  - Reviewed Category 1 issues to verify that GEIS conclusions remained valid for HNP
  - Met with State and Federal regulatory agencies for input
  - Performed environmental survey for T&E species
  - Performed mussel survey in Altamaha River
  - Environmental Report received environmental, legal and peer reviews
  - Process and procedures in place governed by Environmental Protection Plan to assure new & significant information is adequately addressed.

Environmental Report

- **Environmental Justice Review**
  - SNC followed guidance in NRR Procedure for Environmental Justice Reviews
  - Evaluation of the Category 2 issues identified no significant environmental impacts
  - Therefore there are no disproportional high and/or adverse impacts on any member of the public

Environmental Report

- **Alternatives**
  - **Feasible Alternatives**
    - coal-fired generation
    - gas fired generation
    - imported power
  - **Other Alternatives addressed as not feasible**
    - wind
    - solar
    - hydropower
    - geothermal
    - wood energy
    - municipal solid waste
    - other biomass-derived fuels
    - oil
    - nuclear power
    - delayed retirement
    - conservation

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Environmental Report

- **Comparison HNP with Alternatives**
  - 1690 MWe Plant Hatch generation
  - 1800 MWe Coal-fired generation
  - 1760 MWe Gas-fired combined-cycle generation
  - 1690 MWe Replacement power

- **Comparison of potential environmental impacts**
  - Land Use
  - Ecology
  - Aesthetics
  - Water Quality
  - Air Quality
  - Solid Waste
  - Human Health
  - Socioeconomics
  - Culture

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Environmental Report

- **Unavoidable Adverse Impacts**
  - No significant adverse impacts associated with the continued operation of HNP were identified
  - No significant refurbishment activities necessary to support continued operation of HNP
- **Irreversible or Irretrievable Resource Commitments**
  - Spent Fuel Assemblies
- **Short-Term Versus Long-Term Productivity**
  - Incremental but small effect on long term air, water and land conditions
  - No long term adverse effects were identified
  - GPC environmental stewardship will enhance productivity

Environmental Report

- **Status of Compliance**
  - List of HNP permits and compliance status
  - SNC personnel responsible for monitoring and ensuring compliance with permits
  - SNC has measures in place to ensure environmentally sensitive areas or species of concern are adequately protected

Environmental Report

- **Conclusions**
  - Environmental impacts from HNP license renewal are small
  - No unique plant characteristics identified that could affect the environment
  - Federally-listed or State-listed T&E species present on-site or transmission line ROWs will not be impacted
  - No significant historic or archaeological properties located on-site or transmission line ROWs identified
  - No environmental justice issues identified
  - Alternative generation impacts will be greater than license renewal

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 22, 2000

LICENSEE: SOUTHERN NUCLEAR OPERATING CO., INC.

FACILITY: EDWIN I. HATCH NUCLEAR PLANT, UNIT Nos. 1 AND 2

SUBJECT: SUMMARY OF MEETING WITH SOUTHERN NUCLEAR OPERATING CO., INC., REGARDING HATCH UNITs 1 AND 2 LICENSE RENEWAL APPLICATION

On February 10, 2000, representatives of Southern Nuclear Operating Co., Inc. (SNC), met with the Nuclear Regulatory Commission (NRC) staff to provide an overview of its license renewal application to be submitted in accordance with 10 CFR Part 54 requirements and the associated environmental report submitted in accordance with 10 CFR Part 51 requirements. The meeting was divided into two sessions with discussions regarding the renewal application in the morning and discussions on the environmental report in the afternoon. Attendees at the two sessions are listed in Attachments 1 and 2. Presentation materials used by SNC are contained in Attachments 3 and 4.

SNC indicated that it plans to submit the renewal application for the Edwin I. Hatch Nuclear Plant, Unit Nos. 1 and 2 (Hatch) in February 2000. The application will use a "commodity" approach to group and review in-scope structures and components. SNC is monitoring the ongoing review of the Calvert Cliffs and Oconee renewal applications and the resolution of generic renewal issues and has incorporated lessons learned into the Hatch application. Two drafts of the application were peer reviewed and peer feedback was incorporated into the application.

The reactor vendor for Hatch is General Electric. SNC will utilize the generic and relevant information from the Boiling Water Reactor Vessel Internals Project license renewal topical reports.

SNC provided an overview of its organization, its approach to license renewal, and the results of its environmental review. Using the presentation materials, SNC summarized the format and content of its application. SNC's presentation was beneficial as it provided the staff with an overview of the Hatch application which will facilitate the staff's review when the application is received.

William F. Burton

William F. Burton, Senior Project Manager
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-321 and 50-366

Attachments: As stated

cc w/atts: See next page

Souther Nuclear Operating Company
Edwin I. Hatch Nuclear Plant Units 1 and 2

Docket Nos.: 50-321, 50-366

cc:

Mr. D. M. Crowe
Manager, Licensing
Souther Nuclear Operating Company Inc.
P.O. Box 1295
Birmingham, Alabama 35201-1295

Resident Inspector
Plant Hatch
11030 Hatch Parkway N.
Baxley, Georgia 31531

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303

Mr. Charles H. Badger
Office of Planning and Budget
Room 610
270 Washington Street, SW
Atlanta, Georgia 30334

Harold Reheis, Director
Department of Natural Resources
205 Butler Street, S.E., Suite 1252
Atlanta, Georgia 30334

Steven M. Jackson
Senior Engineer-Power Supply
Municipal Electric Authority of Georgia
1470 Riveredge Parkway, N.E.
Atlanta, Georgia 30328-4684

Mr. Douglas J. Walter
Nuclear Energy Institute
1776 I STreet NW
Washington, D.C. 20006
DJW@NEI.ORG

Chairman
Appling County Commissioners
County Courthouse
Baxley, Georgia 31531

Mr. J. D. Woodard
Executive vice President
Southern Nuclear Operating Company, Inc.
P. O. Box 1295
Birmingham, Alabama 35201-1295

Mr. P. W. Wells
General Manager, Edwin I. Hatch Nuclear Plant
Southern Nuclear Operating Company, Inc.
U.S. Highway 1 North
P.O. Box 2010
Baxley, Georgia 31515

Mr. R. D. Barker
Program Manager
Fossil & Nuclear Operations
Oglethorpe Power Corporation
2100 East Exchange Place
P.O. Box 1349
Tucker, Georgia 30085-1349

Charles A. Patrizia, Esq.
Paul, Hastings, Janofsky & Walker
10th Floor
1299 Pennsylvania Ave
Washington, DC 20004-9500

Mr. Ray Baker
Manager, License Renewal Services
Southern Nuclear Operating Company, Inc.
P.O. Box 1295
Birmingham. Alabama 35201-1295

ATTENDANCE LIST
EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
GENERAL AND TECHNICAL OVERVIEW
FEBRUARY 10, 2000

	NAME	ORGANIZATION
1.	William Burton	NRC/NRR/DRIP/RLSB
2.	Hai-Boh Wang	NRC/NRR/DRIP/RLSB
3.	Winston Liu	NRC/NRR/DRIP/RLSB
4.	Raj Anand	NRC/NRR/DRIP/RLSB
5.	Steve Hoffman	NRC/NRR/DRIP/RLSB
6.	Jim Strnisha	NRC/NRR/DRIP/RLSB
7.	P.T. Kuo	NRC/NRR/DRIP/RLSB
8.	Sam Lee	NRC/NRR/DRIP/RLSB
9.	Chris Grimes	NRC/NRR/DRIP/RLSB
10.	Bhagwat Jain	NRC/NRR/DE/EMEB
11.	John Fair	NRC/NRR/DE/EMEB
12.	Francis Grubelich	NRC/NRR/DE/EMEB
13.	John Ma	NRC/NRR/DE/EMEB
14.	David Jeng	NRC/NRR/DE/EMEB
15.	Hans Ashar	NRC/NRR/DE/EMEB
16.	Y.C. (Renee) Li	NRC/NRR/DE/EMEB
17.	Arnold Lee	NRC/NRR/DE/EMEB
18.	Pei-Ying Chen	NRC/NRR/DE/EMEB
19.	Kamal Manoly	NRC/NRR/DE/EMEB
20.	Y.S. Kim	NRC/NRR/DE/EMEB
21.	Duc Nguyen	NRC/NRR/DE/EEIB
22.	Amar Pal	NRC/NRR/DE/EEIB
23.	Paul Shemanski	NRC/NRR/DE/EEIB
24.	George Georgiev	NRC/NRR/DE/EMCB
25.	C.E. Carpenter	NRC/NRR/DE/EMCB
26.	Timir Misra	NRC/NRR/DE/EMCB
27.	Matthew Mitchell	NRC/NRR/DE/EMCB
28.	Carolyn Lauron	NRC/NRR/DE/EMCB
29.	James Davis	NRC/NRR/DE/EMCB
30.	Pat Patnaik	NRC/NRR/DE/EMCB
31.	William Koo	NRC/NRR/DE/EMCB
32.	Kris Parczewski	NRC/NRR/DE/EMCB
33.	Louise Lund	NRC/NRR/DE/EMCB
34.	Lee Banic	NRC/NRR/DE/EMCB
35.	Bill Bateman	NRC/NRR/DE/EMCB
36.	Keith Wichman	NRC/NRR/DE/EMCB
37.	Barry Elliot	NRC/NRR/DE/EMCB
38.	Allen Hiser	NRC/NRR/DE/EMCB
39.	Ted Sullivan	NRC/NRR/DE/EMCB

40.	Meena Khanna	NRC/NRR/DE/EMCB
41.	Stephanie Coffin	NRC/NRR/DE/EMCB
42.	Robert Hermann	NRC/NRR/DE/EMCB
43.	Scott Kirk	Southern Co.
44.	Ray Baker	Southern Co.
45.	Louis Long	Southern Nuclear
46.	James Davis	Southern Nuclear
47.	Charles Pierce	Southern Nuclear
48.	Don Palmrose	NUS-LIS
49.	Len Olshan	NRC/NRR/DLPM
50.	Kathryn Sutton	Winston Strawn
51.	Tatsuya Taminami	Tokyo Electric
52.	Goutam Bagchi	NRC/NRR/DE
53.	Mark Crisler	SCS
54.	Muhammad Razzaque	NRC/NRR/DSSA/SRXB
55.	Caudle Julian	NRR/R II

ATTENDANCE LIST
EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
ENVIRONMENTAL OVERVIEW
FEBRUARY 10, 2000

	NAME	ORGANIZATION
1.	James Luehman	NRC/NRR/DRIP/RGEB
2.	Barry Zalcman	NRC/NRR/DRIP/RGEB
3.	Thomas Kenyon	NRC/NRR/DRIP/RGEB
4.	Robert Jolly	NRC/NRR/DRIP/RGEB
5.	William Burton	NRC/NRR/DRIP/RLSB
6.	Jim Strnisha	NRC/NRR/DRIP/RLSB
7.	Steve Hoffman	NRC/NRR/DRIP/RLSB
8.	Chris Grimes	NRC/NRR/DRIP/RLSB
9.	Ray Baker	Southern Co.
10.	Scott Kirk	Southern Co.
11.	Mark Crisler	Southern Co.
12.	Charles Pierce	Southern Nuclear
13.	Louis Long	Southern Nuclear
14.	James Davis	Southern Nuclear
15.	Kathryn Sutton	Winston Strawn
16.	Mary Ann Parkhurst	PNNL
17.	Janice Moore	NRC/OGC
18.	Robert Palla	NRC/NRR/DSSA/SPSB

Attachment 2