

RE 1200012



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001

June 6, 2000

MEMORANDUM TO: Dr. Mario Bonaca, Chairman  
Plant License Renewal Subcommittee  
*Noel Dudley*  
FROM: Noel Dudley  
Senior Staff Engineers

SUBJECT: SUMMARIES OF MEETINGS RELATED TO LICENSE RENEWAL

The purpose of this memorandum is to status license renewal items that the staff and the Nuclear Energy Institute (NEI) are discussing. These items are derived from an NRC letter to NEI concerning a December 6, 1999 public workshop; minutes of the April 27, 2000 meeting between the staff and Entergy concerning the Arkansas Nuclear One (ANO), Unit 1 license renewal application; the May 12, 2000 meeting of the NRC License Renewal steering Committee; the May 15, 2000 meeting between the staff and NEI concerning the Standard Review Plan (SRP) and Generic Aging Lessons Learned (GALL) report; and the May 25, 2000 meeting between the staff and NEI concerning metal fatigue.

License Renewal Steering Committee

The NRC License Renewal Steering Committee met on May 12, 2000. The staff has received license renewal applications for ANO Unit 1 and Hatch Units 1 and 2. The staff noted that the ANO application was not as complete as the Oconee application. In addition, the Hatch application used a new scoping methodology and a different commodities type approach than any other applicants. Mr. Christopher Grimes explained that only limited efficiencies had been achieved during the review of the second license application due to the lack of standardized methods for preparing and reviewing applications.

The staff expressed frustration with planning its reviews since the number and schedule for receiving the applications is so uncertain. The Steering Committee decided to encourage the Nuclear Energy Institute to continue to provide integrated industry schedules and directed the staff to contact potential applicants directly. The Steering Committee discussed the disposition of the generic license renewal issues and the need for immediate action on complex technical material aging issues.

GALL/SRP

The staff intends to treat the GALL report as a topical report with generic applicability to all plants. It has drafted guidance on the treatment of the GALL report, including examples of license renewal application sections and the corresponding sections of the staff's safety evaluation report. These examples are provided in attachment 1.

The staff and NEI met on May 15, 2000, to discuss the relationship and alignment of NEI 95-10, the SRP, and the GALL report. The industry expressed concerns that the documents are not in

alignment, that the GALL report may be used as a checklist in reviewing license applications, and that a new chapter has not been added to the GALL report as a repository for program evaluations. Slides used by NEI at the meeting are provided as attachment 2.

#### ANO License Renewal Application

During a meeting with Entergy, the ANO Unit 1 licensee, on April 27, 2000, the staff identified concerns in the following areas:

- missing descriptions of attributes for various aging management programs,
- discrepancies between tables and/or text in the application,
- events or anticipated occurrences not addressed in the scoping methodology,
- treatment of metal fatigue, and
- linkage between aging management programs and the applicable components.

The staff provided a list of items that appeared in the Oconee license renewal application and did not appear in the ANO Unit 1 application. Entergy was responsive to the specific areas discussed and, in many cases, indicated that responses would not be difficult to prepare. The minutes for the meeting are provided as attachment 3.

#### Metal Fatigue

The staff and NEI met on May 25, 2000, to define NEI's concerns related to coolant environment effects on components fatigue life associated with license renewal. The stated industry objective was to identify a group of acceptable options for aging management programs that can be referenced by license renewal applicants. The staff stated that the industry should submit programs or technical positions that the staff could review and endorse. The staff noted that additional code runs were not necessary if the industry could quantify the conservatism in the existing calculations and justify extension to 60 years of operations. Slides used by NEI during the meeting are provided as attachment 4.

#### Assessment

The staff and NEI are holding meeting that help to focus the license renewal process. The industry appears concerned about regulatory creep and the staff using the license renewal process to review the adequacy of existing programs. The staff is struggling to develop generic guidance documents, incorporate NEI comments, and review the ANO and Hatch license renewal applications.

Attachments: As Stated

cc: ACRS Members

cc via e-mail w/o att.:

J. Larkins  
H. Larson  
S. Duraiswamy  
ACRS Fellows and Staff

February 3, 2000

Mr. Douglas J. Walters  
Nuclear Energy Institute  
1776 I Street, NW., Suite 400  
Washington, DC 20006-3708

SUBJECT:    GENERIC AGING LESSONS LEARNED (GALL) REPORT AND STANDARD  
              REVIEW PLAN FOR LICENSE RENEWAL (SRP-LR)

Dear Mr. Walters:

We held a public workshop on December 6, 1999, to discuss the development of the Generic Aging Lessons Learned (GALL) report and the Standard Review Plan for License Renewal (SRP-LR). As described in SECY 99-148, "Credit for Existing Programs for License Renewal," the staff plans on referencing the GALL report in the SRP-LR as a basis for determining the adequacy of existing programs.

The staff intends to treat the GALL report as a topical report with generic applicability to all plants. We have drafted guidance on the treatment of the GALL report, including an example on a license renewal application and the corresponding staff safety evaluation report. (See Enclosure 1) We have also drafted the corresponding SRP-LR section as an example. (See Enclosure 2) We plan on using Enclosure 2 as a "guide" to develop the aging management review sections of the SRP-LR. Please note that Enclosure 2 references a Branch Technical Position (BTP) on aging management review. This BTP is intended to be the staff guidance for program acceptance using the "10 program elements" contained in Section 3.0 of the draft SRP-LR, dated September 1997.

As discussed in the public workshop on December 6, 1999, the staff is releasing early drafts of license renewal implementation guidance documents to invite stakeholders participation. Accordingly, we are providing these enclosures for your information and comment. We also would be willing to meet with industry representatives to discuss any comments you may have. If you have any questions regarding this matter, please contact Sam Lee at (301)415-3109.

Sincerely,

*/RA/*

Christopher I. Grimes, Chief  
License Renewal and Standardization Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Project No. 690

Enclosures: As stated

cc w/encl: See next page

**NUCLEAR ENERGY INSTITUTE**  
(License Renewal Steering Committee)

Project No. 690

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## TREATMENT OF THE "GALL" REPORT

### APPROACH

The Generic Aging Lessons Learned (GALL) report should be treated in the same manner as an approved topical report. The staff should not repeat its review of the matters described in the GALL report and should find it acceptable when the GALL report is referenced in a license renewal application. However, the staff should ensure that the material presented in the GALL report is applicable to the specific plant involved. The staff should also verify that the applicant has identified specific programs as described and evaluated in the GALL report.

### Information in the License Renewal Application

In Chapter 2 of the application, the applicant would identify structures and components subject to aging management review for license renewal. Scoping is not affected by the presence of the GALL report. (Note: Chapter 1 of the application contains administrative information.)

In Chapter 3 of the application, the applicant would provide the aging management review of the structures and components identified in Chapter 2. The applicant would reference the GALL report as appropriate. The applicant would briefly describe the system, components, materials, and environment, and state that they are bounded by the GALL report. The applicant would also state that the applicable aging effects and industry and plant-specific operating experience have been reviewed, and are bounded by the GALL report. Any outliers would be discussed in the application. Then, the applicant would state that certain aging management programs and the staff evaluation, as described in the GALL report, are applicable to their plant. The applicant would list those components, applicable aging effects, and aging management programs in a table. If the GALL report indicates that some of these aging management programs should be further evaluated, the applicant would provide the plant-specific proposal to augment these programs. For aging management programs and/or staff evaluation in the GALL report that do not apply or are otherwise different for their plant, the applicant would provide a plant-specific aging management review. Also, for components and/or applicable aging effects that are not addressed in the GALL report, the applicant would provide the plant-specific aging management review.

In Chapter 4 of the application, the applicant would provide the time-limited aging analysis (TLAA) evaluation. Similar to aging management review in Chapter 3, the applicant would reference the GALL report as appropriate. For TLAA's that have been evaluated in the GALL report, the applicant would state that certain TLAA's and staff evaluation, as described in the GALL report, are applicable to their plant. If the GALL report indicates that further evaluation should be performed, the applicant would provide that additional information in the application. For TLAA's that have not been evaluated in the GALL report or if the TLAA evaluation in the GALL report does not apply to the plant, the applicant would provide the plant-specific evaluation.

Enclosure 1

2/3/00

A summary description of all aging management programs and TLAA evaluations would be provided in the final safety analysis report (FSAR) supplement.

#### Staff Review Guidance

The staff should not repeat its review of the matters described in the GALL report. The staff should ensure that the material presented in the GALL report is applicable to the specific plant involved. For a particular system, the standard review plan for license renewal (SRP) should contain a summary table listing all the components, aging effects, and aging management programs, indicating whether the program is acceptable without change or should be further evaluated, as described in the GALL report. The staff would verify that the applicant has identified the appropriate programs as described and evaluated in the GALL report. The focus of the staff review would be on augmented programs for license renewal. The staff would also review information that is not addressed in the GALL report or is otherwise different from that in the GALL report. In addition, the staff would review the FSAR supplement based on the SRP.

**EXAMPLE**

Containment Spray System (part of the Engineered Safety Features). Note: This example is for illustration only.

This example shows information in the license renewal application and the corresponding staff safety evaluation report.

Example: License Renewal Application

3.3 Engineered Safety Features

The Engineered Safety Features at Plant X evaluated in this application consist of: ....., Containment Spray System,....

....

The Containment Spray System provides borated water to reduce the temperature inside containment in accident conditions, as described in FSAR Section Y. The system consists of stainless steel and carbon steel components, such as piping, valves, pumps, and bolting, orifice, spray heads (see Table 2.Z in this application). The internal environment is borated water and the external environment is containment air. A review of the industry experience shows that stagnant portions of the containment spray stainless steel piping have experience cracking. However, this aging effect has not been observed at Plant X.

....

Based on a review of the system, components, materials, environment, applicable aging effects, and operating experience, the information in the GALL report (Chapter V of Reference 1) regarding the Engineered Safety Features bounds Plant X. However, carbon steel piping and isolation valve in the Containment Spray System are not addressed in the GALL report and are evaluated in Sections 3.3.4.1 and 3.3.4.2 of this application.

3.3.1 Aging Management Programs Evaluated in the GALL Report that Are Relied on for License Renewal

The following aging management programs and the staff evaluation for the Engineered Safety Features, as described in the GALL report, are applicable to Plant X:

GALL Item No.	Aging Effect or Mechanism	Aging Management Program	GALL Recommendation
V.A.1.1 thru 1.3, ....	Pitting and crevice corrosion	Inservice inspection and water chemistry	Further evaluation is recommended (see Section 3.3.2.1 of this application)
V.A.1.4, ....	Corrosion/ boric acid wastage of external surfaces	NRC Generic Letter 88-05 and inservice inspection	No further evaluation is recommended
....			

3.3.2 Further Evaluation of Aging Management as Recommended by the GALL Report

### 3.3.2.1 Detection of Pitting and Crevice Corrosion

The GALL report indicates that a one-time inspection of representative sample of the system population and most susceptible locations in the Containment Spray System should be conducted to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended periods.... For license renewal, Plant X is proposing ....

### 3.3.3 Aging Management Programs or Evaluations that Are Different from those Described in the GALL Report

#### 3.3.3.1 Aging Management Review of Stress Corrosion Cracking of Stainless Steel Piping and Fittings

The aging management program for stress corrosion cracking of stainless steel piping and fittings up to the isolation valve of the Containment Spray System (Item No. V.A.1.1 of the GALL report) at Plant X is different from that evaluated in the GALL report. Plant X....

### 3.3.4 Components or Aging Effects that Are Not Addressed in the GALL Report

#### 3.3.4.1 Aging Management Review of Carbon Steel Piping

Plant X....

#### 3.3.4.2 Aging Management Review of Isolation Valve Body

Plant X....

### 3.3.5 FSAR Supplement

The proposed FSAR Supplement for the Engineered Safety Features is as follows:

Program	Description of Program	Implementation Schedule
Water chemistry program	To mitigate aging effects on internal surfaces that are exposed to borated water as process fluid, chemistry programs are used to control primary water chemistry for impurities (chloride, fluoride, and sulfate) that accelerate corrosion.	Existing program

<p>One-time inspection of Containment Spray System</p>	<p>To verify the effectiveness of the chemistry program and to supplement the limited scope of leakage monitoring program, one-time inspection of internal surfaces of components (using visual inspection) at the most susceptible locations is performed to ensure that degradation is not occurring as a result of corrosion....</p>	<p>Program will be implemented by ....</p>
<p>Implementation of NRC Generic Letter 88-05</p>	<p>The program consists of: (1) visual inspection of external surfaces that are potentially exposed to borated water for leaks, (2) timely discovery of leak path and removal of the boric acid residues, (3) assessment of the damage, and (4) follow up inspection for adequacy.</p>	<p>Existing program</p>
<p>Inservice inspection in accordance with ASME Section XI, as required in 10 CFR 50.55(a)</p>	<p>The program consists of periodic visual inspection of external surfaces for signs of significant degradation and assessment of the damage and corrective actions.</p>	<p>Existing program</p>
<p>....</p>		

Example: Staff Safety Evaluation Report

3.3 Engineered Safety Features

....

3.3.3 Staff Evaluation

In Section 3.3 of the application, the applicant provided an aging management review of the Engineered Safety Features at Plant X. The applicant referenced the GALL report in its aging management review. The staff has previously evaluated the adequacy of aging management for license renewal as documented in the GALL report. Thus, the staff did not repeat its review of the matters described in the GALL report, except to ensure that the material presented is applicable to the specific plant involved and to verify that the applicant has identified the appropriate programs as described and evaluated in the GALL report. The staff further evaluated certain aging management programs as recommended in the GALL report. The staff also reviewed aging management information provided by the applicant that is different from that in the GALL report or not addressed in the GALL report.

3.3.3.1 Aging Management Programs Evaluated in the GALL Report that Are Relied on for License Renewal

The staff has reviewed the application and determined that the applicant has provided the information necessary to adopt the finding of program acceptability as described and evaluated in the GALL report. The applicant has identified those aging effects for the Engineered Safety Features components that are contained in the GALL report as applicable to its plant. The applicant has identified the programs in the GALL report for the aging management of these components, and they are:

GALL Item No.	Aging Effect or Mechanism	Aging Management Program	GALL Recommendation
V.A.1.1 thru 1.3, ....	Pitting and crevice corrosion	Inservice inspection and water chemistry	Further evaluation is recommended (see Section 3.3.3.2.1 of this safety evaluation)
V.A.1.4, ....	Corrosion/ boric acid wastage of external surfaces	NRC Generic Letter 88-05 and inservice inspection	No further evaluation is recommended
....			

The staff has verified that the applicant has identified the appropriate programs as described and evaluated in the GALL report. Thus, it is acceptable for the applicant to reference the information in the GALL report and no further staff evaluation is necessary if so recommended in the GALL report.

**3.3.3.2 Further Evaluation of Aging Management as Recommended by the GALL Report**

....

**3.3.3.3 Aging Management Programs or Evaluations that Are Different from those Described in the GALL Report**

....

**3.3.3.4 Components or Aging Effects that Are Not Addressed in the GALL Report**

....

**3.3.3.5 FSAR Supplement**

The staff reviewed the proposed FSAR supplement for the Engineered Safety Features....

**3.3.4 Conclusions**

The staff has reviewed the information in Section 3.3, "Engineered Safety Features," of the license renewal application. The staff evaluation concludes that the applicant has demonstrated that the aging effects associated with the Engineered Safety Features will be adequately managed so that there is reasonable assurance that these systems will perform their intended functions in accordance with the current licensing basis during the period of extended operation. The staff also concludes that the FSAR supplement contains an appropriate summary description of the programs and activities for managing the effects of aging for the Engineered Safety Features.

### 3.3 Aging Management of Engineered Safety Features

#### REVIEW RESPONSIBILITIES

PRIMARY-Branch responsible for materials and chemical engineering  
SECONDARY-Branch responsible for mechanical engineering

#### I. AREAS OF REVIEW

This review plan section addresses the aging management review of the Engineered Safety Features for license renewal. For a recent vintage plant, the information related to the Engineered Safety Features is contained in Chapter 6, "Engineered Safety Features," of the plant's Final Safety Analysis Report (FSAR) consistent with the Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (NUREG-0800). Engineered Safety Features consist of systems, such as Emergency Core Cooling System, Containment Heat Removal Systems, Containment Spray, and Control Room Habitability Systems.

The staff has issued a Generic Aging Lessons Learned (GALL) report addressing aging management for license renewal (Reference 1). The GALL report documents generically the staff's basis for determining when existing programs are adequate to manage aging without change and when existing programs should be augmented for license renewal. The GALL report may be referenced in a license renewal application and should be treated in the same manner as an approved topical report.

Because a license renewal applicant may or may not be able to reference the GALL report, the following areas are reviewed:

#### A. Aging Management Programs Evaluated in the GALL Report that Are Relied on for License Renewal

The staff should not repeat its review of the matters described in the GALL report and should find it acceptable when the GALL report is referenced in a license renewal application. However, the staff should ensure that the material presented in the GALL report is applicable to the specific plant involved. The staff should also verify that the applicant has identified specific programs as described and evaluated in the GALL report.

#### B. Further Evaluation of Aging Management as Recommended by the GALL Report

The GALL report provides the basis for identifying those programs that warrant further evaluation during the staff review of a license renewal application. The staff review focus should be on augmented programs for license renewal.

Enclosure 2

C. Aging Management Programs or Evaluations that Are Different from those Described in the GALL Report

The GALL report provides a generic staff evaluation of certain aging management programs. If an applicant does not rely on a particular program for license renewal, or if the applicant indicates that the generic staff evaluation of the elements of a particular program does not apply to its plant, the staff should review the applicant's aging management programs.

D. Components or Aging Effects that Are Not Addressed in the GALL Report

The GALL report provides a generic staff evaluation of certain components and aging effects. If an applicant has identified particular components subject to aging management review for its plant, or if the applicant has identified particular aging effects for a component, that are not addressed in the GALL report, the staff should review the applicant's aging management programs.

E. FSAR Supplement

The FSAR supplement summarizing the programs and activities for managing the effects of aging for the period of extended operation is reviewed.

II. ACCEPTANCE CRITERIA

The acceptance criteria for the areas of review define methods for meeting the requirements of the Commission's regulations in 10 CFR 54.21.

A. Aging Management Programs Evaluated in the GALL Report that Are Relied on for License Renewal

Acceptable methods for managing aging of the Engineered Safety Features are described and evaluated in Chapter V of the GALL report (Reference 1). In referencing the GALL report, an applicant should indicate that the material presented in the GALL report is applicable to the specific plant involved and provide the information necessary to adopt the finding of program acceptability as described and evaluated in the GALL report. An applicant may reference appropriate programs as described and evaluated in the GALL report.

B. Further Evaluation of Aging Management as Recommended by the GALL Report

The GALL report indicates that further evaluation should be performed for:

1. Detection of Pitting and Crevice Corrosion

The management of corrosion of pressure boundary components in the Containment Spray System. A one-time inspection is an acceptable

method to verify the effectiveness of the mitigation and monitoring programs.

2. ....

C. Aging Management Programs or Evaluations that Are Different from those Described in the GALL Report

Acceptance criteria are described in Branch Technical Position 3.0-1.

D. Components or Aging Effects that Are Not Addressed in the GALL Report

Acceptance criteria are described in Branch Technical Position 3.0-1.

E. FSAR Supplement

The summary description of the programs and activities for managing the effects of aging for the period of extended operation in the FSAR supplement should provide appropriate description such that later changes can be controlled by 10 CFR 50.59. The description should contain information associated with the integrated plant assessment regarding the bases for determining that aging effects are managed in the period of extended operation.

III. REVIEW PROCEDURES

For each area of review, the following review procedures are to be followed:

A. Aging Management Programs Evaluated in the GALL Report that Are Relied on for License Renewal

An applicant may reference the GALL report in its license renewal application, as appropriate. The staff should not repeat its review of the matters described in the GALL report. The staff should find it acceptable when the GALL report is referenced in a license renewal application, if the applicant has provided the information necessary to adopt the finding of program acceptability as described and evaluated in the GALL report. The reviewer verifies that the applicant has provided a brief description of the system, components, materials, and environment, and has stated that the particular plant is bounded by the GALL report. The reviewer also verifies that the applicant has stated that the applicable aging effects and industry and plant-specific operating experience had been reviewed by the applicant and are bounded by the GALL report. The reviewer verifies that the applicant has identified those aging effects for the Engineered Safety Features components that are contained in the GALL report as applicable to its plant. The reviewer reviews any outliers identified by the applicant.

The applicant may state that certain aging management programs and the staff evaluation, as described in the GALL report, are applicable to its plant. The

reviewer verifies that the applicant has identified the appropriate programs as described and evaluated in the GALL report. Programs evaluated in the GALL report regarding the Engineered Safety Features are tabulated in Table 3.3-1 of this review plan section. No further staff evaluation is necessary if so recommended in the GALL report.

B. Further Evaluation of Aging Management as Recommended by the GALL Report

1. Detection of Pitting and Crevice Corrosion

The reviewer reviews the applicant's augmented program to manage corrosion of pressure boundary components in the Containment Spray System. Aging management programs for the Containment Spray System include the chemistry program and the leakage monitoring program. However, the GALL report recommends further evaluation to verify the effectiveness of the chemistry program and to supplement the limited scope of the leakage monitoring program. An acceptable method is a one-time inspection as recommended in the GALL report. The reviewer reviews the applicant's proposed program. The program should consist of a one-time inspection of internal surfaces of components (using visual inspection) at the most susceptible locations is performed to ensure that degradation is not occurring as a result of corrosion....

2. ....

C. Aging Management Programs or Evaluations that Are Different from those Described in the GALL Report

Review procedures are described in Branch Technical Position RLSB 3.0-1.

D. Components or Aging Effects that Are Not Addressed in the GALL Report

Review procedures are described in Branch Technical Position RLSB 3.0-1.

E. FSAR Supplement

The reviewer verifies that the applicant's FSAR supplement for aging management of the Engineered Safety Features for license renewal is consistent with Table 3.3-2 of this review plan section. The reviewer also verifies that the applicant has provided FSAR supplement for Subsection III.C, "Aging Management Programs or Evaluations that are Different from those Described in the GALL Report," and Subsection III.D, "Components or Aging Effects that are Not Addressed in the GALL Report," of this review plan section using a format similar to that in Table 3.3-2.

#### IV. EVALUATION FINDINGS

The reviewer verifies that sufficient and adequate information has been provided to satisfy the provisions of this review plan section and the staff's evaluation supports conclusions of the following type, to be included in the staff's safety evaluation report:

The staff evaluation concludes that the applicant has demonstrated that the aging effects associated with the Engineered Safety Features will be adequately managed so that there is reasonable assurance that these systems will perform their intended functions in accordance with the current licensing basis during the period of extended operation. The staff also concludes that the FSAR supplement contains an appropriate summary description of the programs and activities for managing the effects of aging for the Engineered Safety Features.

#### V. IMPLEMENTATION

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

#### VI. REFERENCES

1. NUREG-??, "Generic Aging Lessons Learned (GALL) Report," ....

**TABLE 3.3-1: Aging Management Programs Evaluated in the GALL Report  
for Engineered Safety Features**

GALL Item No.	Aging Effect or Mechanism	Aging Management Program	GALL Recommendation
V.A.1.1 thru 1.3, ....	Pitting and crevice corrosion	Inservice inspection and water chemistry	Further evaluation is recommended (see III.B.1 of this review plan section)
V.A.1.4, ....	Corrosion/ boric acid wastage of external surfaces	NRC Generic Letter 88-05 and inservice inspection	No further evaluation is recommended
....			

**TABLE 3.3-2: FSAR Supplement for Aging Management of Engineered Safety Features**

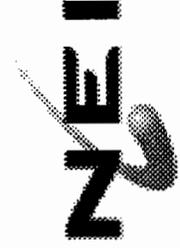
Program	Description of Program	Implementation Schedule
Water chemistry program	To mitigate aging effects on internal surfaces that are exposed to borated water as process fluid, chemistry programs are used to control primary water chemistry for impurities (chloride, fluoride, and sulfate) that accelerate corrosion.	Existing program
One-time inspection of Containment Spray System	To verify the effectiveness of the chemistry program and to supplement the limited scope of leakage monitoring program, one-time inspection of internal surfaces of components (using visual inspection) at the most susceptible locations is performed to ensure that degradation is not occurring as a result of corrosion....	Program will be implemented by ....
Implementation of NRC Generic Letter 88-05	The program consists of: (1) visual inspection of external surfaces that are potentially exposed to borated water for leaks, (2) timely discovery of leak path and removal of the boric acid residues, (3) assessment of the damage, and (4) follow up inspection for adequacy.	Existing program
Inservice inspection in accordance with ASME Section XI, as required in 10 CFR 50.55(a)	The program consists of periodic visual inspection of external surfaces for signs of significant degradation and assessment of the damage and corrective actions.	Existing program
....		



**NEI/NRC Meeting On  
GALL/SRP**

**May 15, 2000**

**ATTACHMENT 2**





# Purpose Of Meeting

Discuss Relationship and Alignment of  
NEI 95-10/Standard Review  
Plan/GALL



# Application Format and Content

- Application Chapter 2
  - Plant scoping/screening process and results
- Application Chapter 3
  - Integrated Plant Process
- Application Chapter 4
  - Time Limited Aging Analyses



# Standard Application Format and the SRP/GALL

- Application Chapter 2
  - Plant scoping/screening process and results
- Application Chapter 3
  - Integrated Plant Assessment
  - Implies starting with SCs in GALL
- Conclude documents are not in alignment.



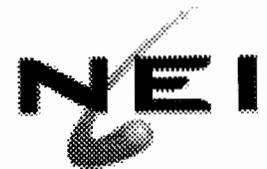
# Aligning The Documents

- Clearly define the purpose and use of GALL
- Revise NEI 95-10/Standard Application format to incorporate the use of GALL
- Revise the SRP to reflect updated NEI 95-10



# Purpose of GALL

- Purpose of GALL
  - Topical report and SER on acceptable aging management programs
  - Provide generic evaluation of aging management programs
  - Provide linkage between information in the application and program evaluations



# Purpose of GALL

- GALL is NOT:
  - A checklist of all the components subject to an aging management review
  - A checklist of all the aging effects subject to an aging management review
  - A checklist of required aging management programs
  - The starting point for reviewing the Integrated Plant Assessment



# Observations/ Recommendations

- Existing GALL is inefficient for the program reconciliation
- Create a new GALL chapter as a repository for program evaluations

# Features of New Chapter

- Each program evaluated once
- Focus on materials, environment, aging effects – not systems and components
- Reference applicable GALL sections



# Features of New Chapter

- Allows flexibility to apply programs to similar plant systems not evaluated in GALL
- Reconciliation to specific systems and components not necessary.



May 9, 2000

LICENSEE: Entergy Operations, Inc  
FACILITY: Arkansas Nuclear One, Unit 1  
SUBJECT: APRIL 27, 2000 MEETING MINUTES, ARKANSAS NUCLEAR ONE, UNIT 1,  
LICENSE RENEWAL APPLICATION REVIEW

Dear Mr. Anderson:

On April 27, 2000, members of the Entergy staff met with NRC staff members in a public meeting to discuss the license renewal application (LRA) for Arkansas Nuclear One, Unit 1 (ANO-1). Enclosure 1 to this letter is the handout from the meeting that identifies the specific areas of the LRA discussed during the meeting.

In general, the staff had concerns in the following areas: missing descriptions of attributes for various aging management programs, discrepancies between tables (and/or text) in the application, events or anticipated occurrences not addressed in scoping methodology, treatment of fatigue, and linkage between aging management programs and the applicable components, particularly for the auxiliary systems. In most areas, information needs involved subjects that were addressed by Duke or BG&E in their applications or responses to staff questions.

Entergy was responsive to the specific areas discussed and, in many cases, indicated that responses would not be difficult to prepare. They described their review process, and their reasons for the level of information provided in the application. We discussed the lessons from the review activities performed to date and the NRC staff will incorporate the lessons-learned into the license renewal process.

As a result of this meeting and the information shared, the staff is expecting revisions to the necessary tables to reflect the text of the LRA and Entergy's response to the staff's request for additional information (RAIs); additional details to supplement the LRA in response to the staff's RAIs, and identification of the appropriate references that will provide the basis for the aging management programs credited in the ANO-1 LRA.

C. G. Anderson

-2-

May 9, 2000

We will continue to exchange information as necessary to ensure a clear understand of the level of information needed for the staff's review, and an understand of Entergy's response to the staff's requests for information.

Sincerely,

*/RA/*

Robert J. Prato, Project Manager  
License Renewal and Standardization Branch  
Division of Regulatory Improvement Program  
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosure: As stated

cc w/encl: See next page

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cc w/encl: See next page

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**\* See previous concurrence**

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NAME	EHylton *	RPrato *	RWessman *	CIGrimes
DATE	5/ 3 /00	5/ 3 /00	5/ 5 /00	5/ 9/00

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APRIL 27, 200, MEETING ATTENDANCE LIST  
LICENSE RENEWAL APPLICATION TECHNICAL REVIEW

<u>Participant</u>	<u>Organization</u>
1. Edward Andruszkiewicz	NRC/NRR
2. Andrea Lee	NRC/NRR/DE/EMCB
3. John Fair	NRC/NRR/DE/EMEB
4. Amar Pall	NRC/NRR/DE/EEIB
5. Jeff Mulvehill	Southern Nuclear
6. Yueh-Li (Renee) Li	NRC/NRR/DE/EMEB
7. Meena Khanna	NRC/NRR/DE/EMCB
8. Sikhindra Mitra	NRR/NRR/DRIP/RLSB
9. Alan Cox	Entergy
10. Garry G. Young	Entergy
11. Natalie Mosher	Entergy Ops
12. J. Rajan	NRC/NRR/DE/EMEB
13. Hans Ashar	NRC/NRR/DE/EMEB
14. Dick Wessman	NRC/NRR/DE
15. Chris Grimes	NRC/NRR/DRIP/RLSB
16. Y. S. Kim	NRC/NRR/DE/EMEB
17. Farideh Saba	NUSIS
18. P. Milano	NRC/NRR/DE/EMCB
19. J. Davis	NRC/NRR/DE/EMCB
20. M. Banic	NRC/NRR/DE/EMCB
21. K. Wichman	NRC/NRR/DE/EMCB
22. Kamal Manoly	NRC/NRR/DE/EMEB
23. Goutam Bagchi	NRC/NRR/DE
24. George Georgiev	NRC/NRR/DE/EMCB
25. Juan Peralta	NRC/NRR/DIPM/IQMB
26. Greg Galletti	NRC/NRR/DIPM/IQMB
27. Duc Nguyen	NRC/NRR/DE/EEIB
28. Pat Patnaik	NRC/NRR/DE/EMCB
29. John Rycyna	CNS FOR OPPO
30. Butch Burton	NRC/NRR/DRIP/RLSB
31. David C. Jeng	NRC/NRR/DE/EMEB
32. W. H. Bateman	NRC/NRR/DE/EMCB
32. Robert Prato	NRC/NRR/DRIP/RLSB

**ARKANSAS NUCLEAR ONE, UNIT 1**

**LICENSE RENEWAL APPLICATION**

**TECHNICAL REVIEW**

## ANO-1/OCONEE REVIEW COMPARISON (Scoping and Screening Methodology, Section 2.1)

<u>ISSUE</u>	<u>Oconee</u>	<u>ANO-1</u>	<u>Difference</u>
Scoping methodology	<p>Scoping of safety-related SSCs was based on DBEs including:</p> <p>(1) 20 DBAs - FSAR Chapter 15, Accident Analysis</p> <p style="text-align: center;">-and-</p> <p>(2) An additional 13 events including Anticipated Operational Occurrences, Natural Phenomema, and External Events</p>	<p>Scoping of safety-related SSCs was based on DBEs including:</p> <p>(1) 17 DBAs - FSAR Chapter 14, Accident Analysis</p>	<p>ANO-1 Application does not describe a methodology for scoping of safety related SSCs based on DBEs that include Anticipated Operational Occurrences, Natural Phenomema, and External Events</p>

**ANO-1/OCONEE REVIEW COMPARISON  
(Reactor Coolant System/Section 3.2)**

<u>ISSUE</u>	<u>OCONEE</u>	<u>ANO-1</u>	<u>DIFFERENCE</u>
GSI-190	Plant Specific Resolution Incorporating Environmental Factors (NUREG-1723 Section 4.2)	Vague Reference to Risk Informed ISI Program	No Specific Proposal for Staff Review
Bulletin 88-08	Commitment to Verify Existing Analysis With Thermal Data (NUREG-1723 Section 4.2)	Statement that Scope of Previous Commitment Modified by ASME Code Case N-560	Details of Modified Inspection Program Not Provided

*Contact: J. Fair*

**ANO-1/OCONEE REVIEW COMPARISON  
(Engineered Safeguards/Section 3.3)**

<u>ISSUE</u>	<u>OCONEE</u>	<u>ANO-1</u>
ESF Components Subject to Aging Effects	Addressed Effects of Aging for Reactor Building Spray Nozzles, BWST Carbon Steel External Piping/Components, and Reactor Building Cooling System Heat Exchanger Copper Fins (Section 3.5.21).	Did Not Specifically Address the Effects of Aging for Reactor Building Spray Nozzles, BWST Carbon Steel External Piping/Components, and Reactor Building Cooling System Heat Exchanger Copper Fins (Section 3.3).

*Contact:  
P. Milano*

ISSUE

OCONEE

ANO-1

Potential Aging Effects

Listed "Loss of Material" and "Cracking" as Potential Aging Effects Associated With the Exposure to a Boric Acid Environment (Section 3.5.3.1).

Only Listed "Cracking" as a Potential Aging Effect Associated With the Exposure to a Boric Acid Environment (Section 3.3).

Operating History

Provided Specific Reference With Regard to Reviews of Operating History With Affects on Aging (Section 3.5.3.2).

Specific Reference With Regard to Reviews of Operating History With Affects on Aging Was Not Provided (Section 3.3).

*Contact:  
P. Milano*

**ANO-1/OCONEE REVIEW COMPARISON  
(Steam and Power Conversion System/Section 3.5)**

<u>ISSUE</u>	<u>OCONEE</u>	<u>ANO-1</u>
Galvanic Corrosion	Identified the components that were potentially affected by the loss of material due to galvanic corrosion and discussed the galvanic susceptibility inspection that manages the aging effects of galvanic corrosion (Section 3.7.2.2).	Did not Identify the components that were potentially affected by the loss of material due to galvanic corrosion and did not address how the aging effects of galvanic corrosion would be managed (Section 3.5.2).

*Contact:  
G. Georgiev*

ISSUE

OCONEE

ANO-1

Selective Leaching  
of Cast Iron

Addressed the aging effects of selective leaching of the emergency feedwater system valve components made of cast iron and discussed how the aging effects of these components will be managed during extended operation (Section 3.7.2.2).

Did not address aging effects of selective leaching of the emergency feedwater system valve components made of cast iron and did not address how the aging effects of these components would be managed during extended operation (Section 3.5.3).

Contact:  
G.Georgiev

**ANO-1/OCONEE REVIEW COMPARISON  
(Structures and Structural Components/Section 3.6)**

<u>ISSUE</u>	<u>OCONEE</u>	<u>ANO-1</u>
Structural Joint Sealants and Caulking	Addressed How the Aging Effects of Structural Joint Sealants and Caulking Will be Managed During Extended Operation (Section 3.8.3.1.8).	Did Not Specify Structural Joint Sealants and Caulking as Components in the License Renewal Scope (Section 2.4).  Did Not Provide Specific Information Addressing Aging Effects Management of Structural Joint Sealants and Caulking (Section 3.6).

*Contact: D. Jeng*

## **ANO-1/OCONEE REVIEW COMPARISON (Electrical I&C System and EQ/Section 3.7)**

<u>ISSUE</u>	<u>OCONEE</u>	<u>ANO-1</u>
Electrical and Instrumentation and Control Component Types	Provided a List of Electrical and Instrumentation and Control <u>Component Types</u> (Section 2.2.3.7.2.1).	Only Identified Those <u>Systems</u> Containing Electrical Components That are in the Scope of LR (Section 2.2.1).
	Identified the Fire Protection Electrical Components (Section 2.2.3.7.2.1).	No Reference to Fire Protection Electrical Components (Section 2.5.2).

*Contacts:  
D. Nguyen  
A. Pal*

ISSUE

OCONEE

ANO-1

Underlying Assumptions Regarding EQ Calculations

Provided Discussion Regarding Major Plant Modifications or Events to Have Changed the Temperature and Radiation Values That Were Used in the Underlying Assumptions in the EQ Calculations (Section 4.2.8.2).

No Discussion Provided Regarding Major Plant Mods, etc. to Change the Temperature and Radiation Values Used in the Underlying Assumptions in EQ Calculations (Section 4.4).

*Contacts:  
D. Nguyen  
A. Pal*

ISSUE

Refined Temperature Data for the Reactor, Auxiliary, Turbine, and Alternate Diesel Buildings

OCONEE

Provided Discussion of How the Refined Temperature Data Was Determined (Section 4.2.8.2).

ANO-1

Discussion of the Determination of the Refined Temperature Data Was Not Provided (Section 4.4).

*Contacts:  
D. Nguyen  
A. Pal*

***Aging Management Program  
Comparison  
Oil Analysis Program***

<b>Draft SRP Elements for Aging Management Program</b>	<b>Addressed in Oconee SER Section Number(s)</b>	<b>ANO-1 LRA Comment and Section Number(s)</b>
Program Scope	3.6.3.3.2	4.14
<ul style="list-style-type: none"> <li>• identified program</li> </ul>		<p>Not Complete RAI: Table 3.4–2 of the LRA lists Oil Analysis as an aging management program for fouling in diesel fire pump subsystem heat exchanger(s). The environments listed are treated water for the inside of tubing and lube oil for the exterior of tubing. Please clarify whether the oil analysis program applies to fouling in a treated water environment.</p>
<ul style="list-style-type: none"> <li>• identified structures and components</li> </ul>		<p>Discrepancies: RAI: The applicant cited Oil Analysis Program to manage loss of material in both carbon steel compressor and condenser (heat exchanger) bodies exposed to lubricating oil [Table 3.4-13]. But Section 4.14 of Appendix B to the LRA, which describes this program, includes control room ventilation compressor but not condenser within its scope. Please explain this discrepancy.</p>
Preventive or Mitigative Actions	Not Stated/Not Required	Not Stated/Not Required
<ul style="list-style-type: none"> <li>• described activities</li> </ul>		
<ul style="list-style-type: none"> <li>• provided the basis for these activities</li> </ul>		

Draft SRP Elements for Aging Management Program	Addressed in Oconee SER Section Number(s)	ANO-1 LRA Comment and Section Number(s)
Parameters Inspected or Monitored		
<ul style="list-style-type: none"> <li>• identified the parameters</li> </ul>		YES
<ul style="list-style-type: none"> <li>• identified the technique for measuring</li> </ul>		NO RAI: Please describe the oil analysis process or methods used to detect a loss of material or cracking in a given component, i.e., how the measurement of particulates in an oil sample provides information leading to the detection of the applicable aging effect for a particular component.
Detection of Aging Effects		
<ul style="list-style-type: none"> <li>• identified sampling frequency</li> </ul>		YES
Monitoring and Trending Activities		RAI: The applicant has not provided sufficient information to assess whether monitoring and trending activities are in place that would predict loss of material or cracking, and allow timely corrective actions for components exposed to lube oil environments. Please provide this information
<ul style="list-style-type: none"> <li>• identified activities</li> </ul>		NO

Draft SRP Elements for Aging Management Program	Addressed in Oconee SER Section Number(s)	ANO-1 LRA Comment and Section Number(s)
Acceptance Criteria		
<ul style="list-style-type: none"> <li>identified acceptance criteria</li> </ul>		<p>NO</p> <p>RAI: Please describe the acceptance criteria, and their bases with respect to applicable aging effects and environments, for the oil analysis activities listed in Section 4.14 of Appendix B to the LRA. Include the method(s) for analyzing results of the listed tests.</p>
<ul style="list-style-type: none"> <li>provided the basis for the acceptance criteria</li> </ul>		<p>NO</p>
Operating Experience		
<ul style="list-style-type: none"> <li>discussed operating experience with existing programs, including past corrective actions resulting in program enhancements</li> </ul>		<p>Not Complete</p> <p>RAI: In Section 4.14, Oil Analysis of Appendix B to the LRA, the applicant states that operating experience and monitoring of lube oil has shown that the oil has remained free of excess water, but does not address the presence of particulates. The staff would like to know whether the surfaces of components exposed to lubrication oil have experienced any significant losses of material or cracking thus far during operation at ANO-1. Provide objective evidence that the oil analysis activities will successfully manage the stated aging effects and ensure maintenance of intended functions of components in the applicable auxiliary systems.</p>

***Aging Management Program Comparison  
Service Water Chemical Control***

<b>Draft SRP Elements for Aging Management Program</b>	<b>Addressed in Oconee SER Section Number(s)</b>	<b>ANO-1 LRA Comment and Section Number(s)</b>
Aging Management Program	Treated Water Systems Stainless Steel Inspection	Service Water Chemical Control
Program Scope		
• identified program	4.3.13	4.6.5
• identified structures and components	4.3.13	Not Specific
Preventive or Mitigative Actions		
• described activities	4.3.13	Not Addressed
• provided the basis for these activities	4.3.13	Not Addressed
Parameters Inspected or Monitored		
• identified the parameters	4.3.13	Not Specific
• identified the technique for measuring	4.3.13	Not Specific
Detection of Aging Effects		
• identified sampling frequency	4.3.13	Not Specific "As Required"
Monitoring and Trending Activities		
• identified activities	Not Identified	Not Identified

<b>Draft SRP Elements for Aging Management Program</b>	<b>Addressed in Oconee SER Section Number(s)</b>	<b>ANO-1 LRA Comment and Section Number(s)</b>
Acceptance Criteria		
<ul style="list-style-type: none"> <li>• identified acceptance criteria</li> </ul>	4.3.13	Not Specific "In Site Procedures"
<ul style="list-style-type: none"> <li>• provided the basis for the acceptance criteria</li> </ul>	4.3.13	Not Specific "Based on EPRI Guidelines" 4.6.5
Operating Experience		
<ul style="list-style-type: none"> <li>• discussed operating experience with existing programs, including past corrective actions resulting in program enhancements</li> </ul>	Not Addressed One time inspection	General Discussion 4.6.5

Arkansas Nuclear One  
Docket No. 50-313

cc:

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# Fatigue of Metal Components for 60-Year Plant Life

May 25, 2000

NRC Offices

D. WALTERS, NEJ

G. ROBISON, DUKE,

CHAIRMAN OF EPRI LIFE

CYCLE MANAGEMENT COMMITTEE

# Purpose of Meeting

- Describe utility confusion on the issue of coolant environment effects on component fatigue life
- Determine if the meeting participants can envision an acceptable solution
- Determine what is needed to reach this acceptable solution

# Introduction:

## What The Utilities Are Reading

- Pressure Vessel Research Council (Greg Hollinger) letter to ASME - October 31, 1999
- NRC License Renewal Position (Chris Grimes' Statement) from Fatigue Meeting - November 17, 1999
- NRC Research (John Craig) letter to ASME - December 1, 1999
- NRC Research (Ashok Thadani) letter to EDO (Travers) closing GSI-190 - December 26, 1999
- EPRI letter to ASME - March 3, 2000
- Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants Draft - April 21, 2000 (specifically, Sections 4.3.1.2 and 4.3.2.2)
- One that seems missing: Office Director Letter covering GSI resolution per NUREG-0933 to all licensees. Released yet?

# Introduction:

## Industry Perspective

- Distinguish between “industry action” and “applicant action”
  - Industry action: investigation of environmental effects on component fatigue life
  - Applicant action: manage fatigue aging effects

# Introduction:

## Industry Perspective

- From what the utilities are reading, it seems that if we were to take a less conservative approach to re-doing fatigue calculations, our hardware might leak. Is this what the issue is all about?
- Or is my current design not fully conservative such that my hardware might leak?

# Introduction: Industry Perspective

- Acceptance of ALWR design vs. current design. The utilities need help better understanding the perceived difference between the design methodologies used.
- The utilities see the need for options that the applicant can take to manage fatigue aging effects.

# EPRI Evaluation of Fatigue Environmental Effects and Conclusions Regarding Need for Fatigue Monitoring Program

- The PNNL risk study used appropriate bounding assumptions to estimate contributions to core damage frequency (CDF) for 47 of the most fatigue-sensitive Class 1 component locations in seven types of LWRs (e.g., older vintage CE plants)
- The extension of these bounding calculations showed only six component locations (e.g., PWR surge line elbows, PWR RPV outlet nozzles, BWR recirculation system RHR return lines) with sufficiently high through-wall cracking frequency to serve as the basis for risk-informed inspection
- The extension of the CDF calculations to through-wall cracking frequency and leakage rates, using the bounding assumptions, is too conservative and should not be used as a basis for license renewal requirements, nor can they serve as the basis for risk-informed management of potential reactor water environmental effects

# EPRI Evaluation of Fatigue Environmental Effects and Conclusions Regarding Need for Fatigue Monitoring Program (Continued)

- Conservatisms in the transient definitions, analytical procedures, fatigue design curves, and other elements of the ASME Code explicit fatigue design process appear to more than compensate for reactor water environmental effects
  - need for additional fatigue environmental effects tests on stainless steel in low oxygen reactor water
- Existing utility fatigue management programs are adequate for license renewal

# Conservatisms in the GSI 190 evaluation (PNNL Risk Study)

- Design basis stresses assumed from NUREG/CR-6260. Experience shows that actual stresses less severe.
- Data on strain rates not available in NUREG/CR-6260, so very slow strain rates assumed for essentially all transients, giving maximum environmental effect.
- Most adverse temperatures (from environmental standpoint) assumed for all stress cycles.
- There was no endurance limit shown at high end of the fatigue (S-N) curve, indicating potential for very low allowable cycles for low stress amplitudes (Figure 1 of paper)

# Conservatisms in the GSI 190 evaluation (PNNL Risk Study), Continued

- Stresses for crack growth were not adjusted for local stress concentrations and probably not for  $K_e$
- Through-wall stress distributions not available from NUREG/CR-6260, so not clear how crack growth evaluated. It is only stated that stress was attenuated.
- No consideration that stresses vary around the pipe circumference - NUREG/CR-6260 only gave maximum value of stress amplitude.
- No consideration given to location-to-location stress differences in plant systems - NUREG/CR-6260 only provided stresses for worst locations.

# Uncertainties\* in the PNNL Risk Study

- All components simulated as pipe geometry with a circumferential crack. Effect of assumption unknown.
- A log-normal parameter  $Z$  was used in the crack growth rate curve for carbon steel. A similar parameter  $C$  was used for austenitic stainless steel. No basis provided.
- Crack growth rate equations had  $R = K_{\min}/K_{\max}$  dependency. Not possible to compute exact stress levels from data in NUREG/CR-6260. Unclear on approach used.

---

\*These uncertainties might be resolved when the report is published and available for industry review

## Industry Actions

- Perform additional pc-PRAISE code calculations, relaxing some of the most conservative assumptions, in order to obtain a more realistic estimate of the probability of crack initiation and growth at fatigue-sensitive component locations
- Obtain additional low-cycle fatigue data for wrought and cast austenitic stainless steels in reactor water environments, using hourglass and/or notched fatigue specimens subjected to strain fields, flow rates and oxidizing conditions typical of components in service
- Develop a cooperative in-service inspection program between a number of PWR utilities to inspect one or two of the most fatigue-sensitive component locations (e.g., surge line elbow), in order to determine the extent of any fatigue crack initiation and growth

## Industry Actions (Continued)

- Perform a review of available reactor water environmental effects data for relevance to plant operating environments
- Revise EPRI technical report TR-105759, *An Environmental Factor Approach to Account for Reactor Water Effects in Light Water Reactor Pressure Vessel Piping and Fatigue Evaluations*, considering recommendations of the PVRC Steering Committee on Cyclic Life & Environmental Effects
- Develop a plan and cost to test representative portions of full-scale piping systems subjected to severe thermal gradient loadings in order to determine their actual fatigue limit

# Conclusions

Industry actions are intended to affirm the adequacy of existing fatigue management programs