

Document 2:  
Industry  
Presentation

# Steam Generator Program

ACRS Materials and Metallurgy Briefing

November 29, 2001

*Jim Riley, NEI*

November 29, 2001

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## Presentation Outline

- Organizational Background
- Industry SG Management Organization
- Regulatory Approach Background
- NEI 97-06 Overview
- Industry SG Program Initiative
- Continuing Evolution
- Industry Communication
- SG Program Generic License Change Package
- Industry / NRC interface
- Summary

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## Organizational Background

- EPRI SGMP organized in 1976 to address SG corrosion concerns
- NUMARC and SGMP worked with the NRC since 1993 to establish a framework for SGDSM and ARCs
- NEI SGIWG and SGTF chartered in 1995 to meet with the NRC on the SG rulemaking

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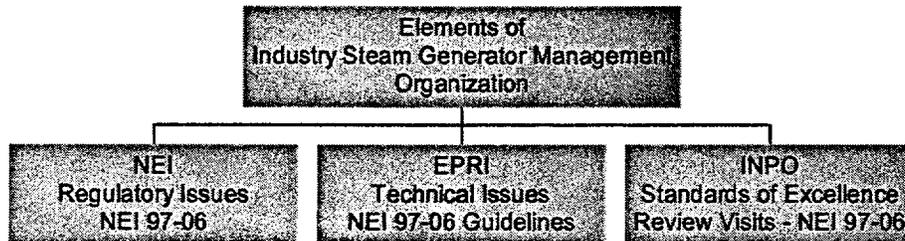
## Overview of Industry Steam Generator Management Organization

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# Industry Organization

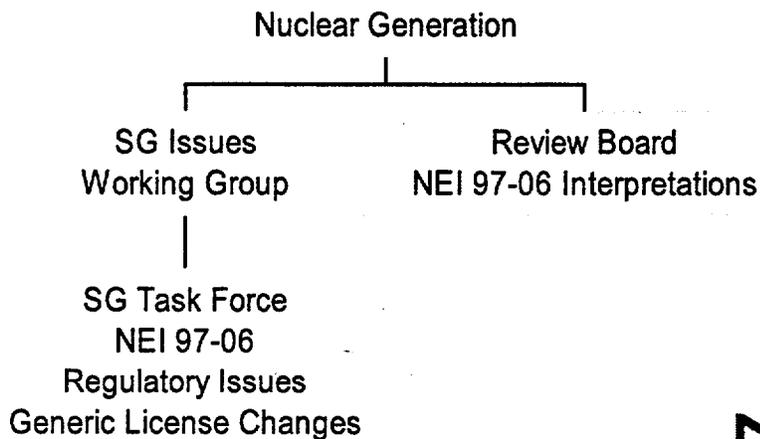


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# NEI Organization



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# NEI Organization

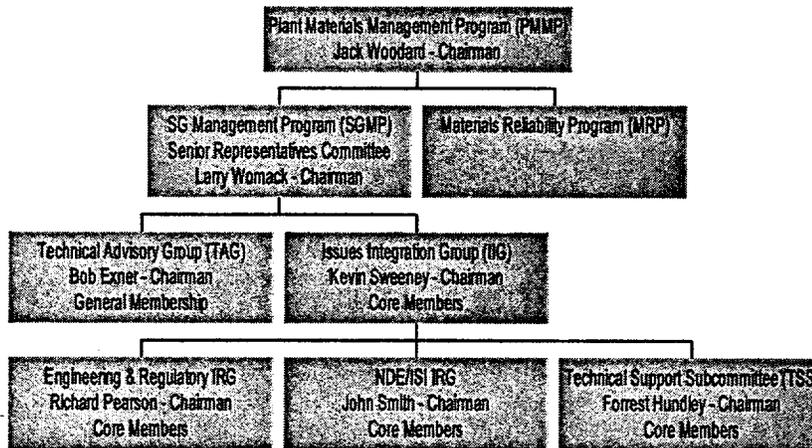
- NEI SG Issues Working Group/Task Force
  - ◆ Developed NEI 97-06
  - ◆ Generic License Change Package
  - ◆ SG Action Plan
- NEI 97-06 Review Board Process
  - ◆ Resolve generic questions about NEI 97-06 and EPRI guidelines
  - ◆ Advisory Panels – Members From SGMP
  - ◆ Review Board – Members From IIG
  - ◆ Interpretations – Posted on Web
  - ◆ SGMP Administrative Procedure

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# Industry/EPRI Organization



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## Industry/EPRI Organization

- **PMMP**
  - ◆ Executive Group
  - ◆ Overall Policy/Budget Approval
  - ◆ Approves EPRI Guidelines
- **SGMP**
  - ◆ General Organization
    - US and Foreign Utilities - Manage SG issues and technology development
  - ◆ SGMP Administrative Procedures
  - ◆ EPRI Guidelines
    - Revision process through Ad Hoc committees – include vendors and consultants
    - Guidelines assigned to specific subcommittees

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SG Degradation Database - Website

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## Industry/EPRI Organization

- **Technical Advisory Group (TAG)**
  - ◆ Information Sharing/Working Groups/Policy Review and Approval
  - ◆ Reviews EPRI Guidelines
  - ◆ 3 Meetings/Year – 1 with Senior Reps
  - ◆ Chemists/Engineers/NDE Specialists
    - People Responsible for SG Programs
  - ◆ Information Forum – NRC Presentations are Invited

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## Industry/EPRI Organization

- Issues Integration Group (IIG)
  - ◆ Interface between TAG and Executive Group
  - ◆ Issue Prioritization – Resource Allocation
  - ◆ Members represent all three NSSS and SG designs
- Engineering and Regulatory Issue Resolution Group (E & R IRG)
  - ◆ Respond to Engineering/Regulatory Issues
  - ◆ SG In Situ Pressure Test Guidelines
  - ◆ SG Integrity Assessment Guidelines
- In-service Inspection / Non-Destructive Examination (ISI/NDE IRG)
  - ◆ Respond to NDE Issues

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## Industry/EPRI Organization

- Technical Support Subcommittee (TSS)
  - ◆ Long term R&D
  - ◆ PWR Secondary Chemistry Guidelines
  - ◆ PWR Primary Chemistry Guidelines
  - ◆ PWR Primary-to-Secondary Leak Guidelines

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## INPO Organization

- Industry's Assessment Organization
- SG Review Visit Program
  - ◆ Peer Participation – Information Sharing
  - ◆ SG Program Recommendations and Strengths
  - ◆ Year end Summary Provided to Industry
  - ◆ Some Follow-up Items
- Operating Experience Programs
  - ◆ Notification of events
  - ◆ Information Sharing
  - ◆ Website

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## Summary

- Industry has a SG Management Program in place that:
  - ◆ Addresses issues promptly
  - ◆ Uses broad based utility participation
  - ◆ Encompasses all SG types/vintages
  - ◆ Issues guidelines and policy
  - ◆ Self monitors through peer reviews
  - ◆ Interfaces with NRC through NEI
  - ◆ Maintains research/improvement efforts

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## Regulatory Approach Background

- In mid 90's regulatory approach shifted from rule to Generic Letter and Draft Guide (DG 1074)
- During the same time frame the industry SGDSM framework developed into NEI 97-06, *Steam Generator Program Guidelines*
- In 1999 the NRC and industry focused on endorsing the SG Program requirements in NEI 97-06

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## NEI 97-06 Overview

- Framework incorporates a balance of prevention, inspection, evaluation, repair, maintenance, and leakage monitoring
- Establishes performance criteria that define the basis for SG operability
- Defines the essential elements of a steam generator program:

Degradation assessment  
Integrity assessment  
Leakage monitoring  
Foreign material exclusion  
Self-assessment

Inspection  
Maintenance and repair  
Water chemistry  
Secondary side integrity  
NRC reporting

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## NEI 97-06 Overview

- NEI 97-06 written as upper level guidance for SG Program requirements
  - Detailed requirements are contained within EPRI SG Guidelines:
    - ◆ SG Examination G/L
    - ◆ Integrity Assessment G/L
    - ◆ In Situ Pressure Test G/L
    - ◆ Primary-to-Secondary Leak G/L
    - ◆ Primary Chemistry G/L
    - ◆ Secondary Chemistry G/L

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## Industry SG Program Initiative

- Revision 0 of NEI 97-06 issued in December 1997
- In December 1997 the NEI NSIAC voted to adopt a formal industry Initiative on SG Program requirements:

*Each licensee will evaluate its existing steam generator program and, where necessary, revise and strengthen program attributes to meet the intent of the guidance provided in NEI 97-06, Steam Generator Program Guidelines, no later than the first refueling outage starting after January 1, 1999.*

- Initiative commits all PWRs to the specified actions

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## Continuing Evolution

- NEI 97-06 and EPRI SG Guidelines are living documents - they are changed in response to new technologies and experience
  - NEI 97-06 revised as necessary (revision 1 issued in January 2001)
  - EPRI SG Guidelines are evaluated for revision biannually
    - ◆ Interim guidance issued as necessary

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## Industry Communication

- SG Program requirements include numerous means of communicating SG experience to PWR plants
  - NEI SG Review Board interpretations (as requested)
  - Interim guidance (as needed)
  - NEI APC Letters
  - SGMP TAG (3 times a year)
  - SGMP Workshops (annually)
  - EPRI SG Guideline revision (biannually)

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## SG Generic License Change Package

- Intended to address the regulatory aspects of the implementation of NEI 97-06 and its referenced EPRI Guidelines
- Content was the subject of numerous meetings between the industry and NRC
- Submitted to the NRC on Feb 4 and revised on Dec 11, 2000
- One more revision will be required

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## SG Generic License Change Package

- Consists of:
  - SG Tube Integrity Tech Spec and Bases
  - Operational Leakage Tech Spec and Bases
  - Administrative Tech Spec addressing:
    - ◆ Condition Monitoring
    - ◆ Change controls on performance criteria, alternate repair criteria, and repair methods ←
    - ◆ Reporting requirements
  - Generic Safety Analysis
  - Generic Significant Hazards Consideration
  - Amendment cover letter template

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## Industry / NRC Interface

- Industry and NRC working on several issues related the GLCP:
  - Inspection intervals and their associated regulatory controls – key issue for approval
    - ◆ General agreement on regulatory controls
    - ◆ Presentation on technical approach
  - Various technical issues - ongoing
- NEI and SGMP will continue to work with the NRC to improve the program and to address emerging issues

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## Summary

- The industry is committed to safe operation
  - Long term program
  - Industry commitment to requirements
  - Prepared and guided by industry experts
  - Living documents - responsive to changes in technology and experience
  - Extensive communication
  - NRC interaction

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## Open Issues

- SG Action Plan technical issues include:
  - Assessment of degradation mechanisms – E&R IRG
  - NDE data quality – SG Exam G/L rev 6
  - NDE qualification – SG Exam G/L rev 6
  - NDE data analysis – SG Exam G/L rev 6
  - Pressure testing – In Situ Test Ad Hoc
  - Operational assessment – IA Ad Hoc
  - Tech Specs - GLCP
  - NEI 97-06 initiative - GLCP



## Open Issues

- SG Action Plan technical issues
  - Industry responses provided to NRC last summer
  - NRC commented on most of the responses
  - Resolution dependent on Ad Hoc committee work, receiving remaining comments, and disposition of the inspection interval issue



# Revision 6 PWR SG Examination Guidelines

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ACRS 11-29-01

EPRI

## Chronology of Guidelines Revisions

- Original Issue, 1981, NDE Center Draft Topical
- Revision 1 1984 , Formal EPRI Report
- Revision 2 1988, Added NSSS Input
- Revision 3 1992, Perf. Demo. Requirements
- Revision 4 1996, Prescriptive Sampling
- Revision 5 1997, Strong Language, "*Shalls*"

Current requirement to assess need for revision at  
least once every two years

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## Background

- PWR SG Examination Guidelines delineates what, when, how to inspect and by whom
  - Results are used in SG assessments
- It is a utility developed document that has benefited from vendors' input and comments
- Work on Revision 6 started in March 2000 and is expected to finish by mid-2002

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## Background

- Rev. 6 draft was completed in April 2001 and received industry review during May 1-June 25
- This presentation highlights the most significant changes to the requirements
  - Prescriptive Inspections
  - Data Quality

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## Sampling Requirements for Prescriptive Based Examinations

Separate sampling requirements for inspection of 600 MA, 600TT (and 800TT), and 690TT materials

- 600MA every outage
- 600TT every other outage
- 690TT every third outage

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## Sampling Requirements for Prescriptive Based Examinations

### 600 MA:

- Inspect 100% of tubes in each SG every 60 EFPM
- SG's shall be inspected each refueling outage
  - Minimum 20% random sample at each inspection
- This requirement is essentially the same as it is in the current Rev. 5 of the Guidelines

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## Sampling Requirements for Prescriptive Based Examinations

### 600 TT:

- Given SGs are free from cracking,
  - Inspect 100% of tubes in each SG in 120, 90, 60, 60,..., EFPMs and with the following conditions:
    - Minimum 20% random sample at each inspection
    - Extended inspection periods require supporting DA and OA
    - Secondary side program requirements are met
    - Examine at least 50% of tubes in each SG by the refueling outage nearest the mid-point of the period and the remaining 50% by the refueling outage nearest the end of the period.
    - No SG can operate for more than two refueling cycles without being inspected.
- If cracking is discovered, the tubing shall be subject to the same rules as for Alloy 600 MA tubing.

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## Sampling Requirements for Prescriptive Based Examinations

### 690 Alloy:

- Given SG are free from active cracking degradation,
  - Inspect 100% of tubes in each SG in 144, 108, 72, 60, 60, 60,... EFPMs with the following conditions:
    - Minimum 20% random sample at each inspection
    - Extended inspection periods require supporting DA and OA
    - Secondary side program requirements are met
    - Examine at least 50% of tubes in each SG by the refueling outage nearest the mid-point of the period and the remaining 50% by the refueling outage nearest the end of the period.
    - No SG can operate for more than three refueling cycles without being inspected.
- If cracking is discovered, the tubing shall be subject to the same rules as for Alloy 600 MA tubing.

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## **600TT and 690TT Inspection Intervals**

- **Basis**

- Collective experience
  - With increasing number of new and replacement steam generators, the aggregate of the 600TT and 690TT steam generators are sampled and inspected with sufficient frequency
  - If any degradation is detected in any 600TT or 690TT steam generator, it must be considered in the degradation assessments of all other plants of the same tubing material and modify inspection plans accordingly
- Compensatory measures
  - If cracking is detected, the inspection interval reverts to 600 MA requirements
  - Secondary side requirements address foreign objects
- Program enhancement over existing regulation
  - Proposed sampling/frequency much more conservative than the current Tech Spec requirement of 3% every 40 months

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## **Data Quality**

- Data quality parameters are for monitoring and answering two basic questions:
  - Is the data getting noisy to the point of affecting flaw detectability and sizing?
  - Have the bounds of the ETSS performance been exceeded such that the performance indices are degraded?
- Provides a frequency, location, acceptance criteria, and corrective action for each of the listed quality parameters.

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## **Current Status**

- Latest draft Rev. 6 is in industry review with comments due by mid-December
- All comments will be addressed and resolved starting January 2002
- Consensus will be achieved, as for the past revisions, with the goal of an industry approved document by mid-2002

**EPRI**