

March 7, 2000

LICENSEE: Baltimore Gas and Electric Company

FACILITY: Calvert Cliffs Nuclear Power Plant, Unit No. 1

SUBJECT: SUMMARY OF THE FEBRUARY 23, 2000, MEETING REGARDING THE CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1 SPRING 2000 STEAM GENERATOR TUBE INSPECTION (TAC NO. MA7986)

On February 23, 2000, the U.S. Nuclear Regulatory Commission (NRC) staff held a meeting at the NRC offices in Rockville, Maryland, with representatives from Baltimore Gas and Electric Company (BGE), the licensee for Calvert Cliffs, Unit No. 1, to discuss the licensee's plans for inspecting steam generator tubing in the upcoming spring 2000 refueling outage. The list of meeting attendees is included as Enclosure 1. Enclosure 2 is a copy of the slides presented by the licensee at the meeting.

The licensee presented the tube inspection scope and associated protocol. The inspection technology regarding bobbin coil and plus point coil probes was presented. The licensee also discussed tube repair methods and in-situ pressures tests. The licensee identified the inspection expansion criteria and examinations of the upper tube bundle.

At the end of the meeting, the NRC staff concluded that the licensee's presentation is useful for the staff to understand the licensee's upcoming steam generator tube inspection.

/RA/

Alexander W. Dromerick, Sr. Project Manager, Section 1  
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Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosures: As stated

cc w/encls: See next page

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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Unit Nos. 1 and 2

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Meeting Summary Dated March 7, 2000

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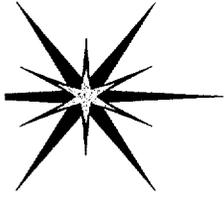
cc: Licensee & Service List (with all enclosures)

**E-MAIL**

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S. Little  
J. Tsao  
E. Sullivan  
L. Lund  
S. Coffin  
S. Peterson  
M. Oprendeck, RGN-I

LIST OF ATTENDEES  
BALTIMORE GAS AND ELECTRIC COMPANY  
CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1  
FEBRUARY 23, 2000

<u>Name</u>	<u>Organization</u>
Alexander Dromerick	NRR/PD I-1
John Haydin	BGE/Calvert Cliffs
Lee Friant	BGE/Calvert Cliffs - NDE
Getachew Tesfaye	BGE
Joseph M. Mate	BGE/Calvert Cliffs
Alan Thornton	BGE/Calvert Cliffs
John Tsao	NRR/DE/EMCB
Ted Sullivan	NRR/DE/EMCB
Louise Lund	NRR/DE/EMCB
Stephanie Coffin	NRR/DE/EMCB



# **CALVERT CLIFFS**

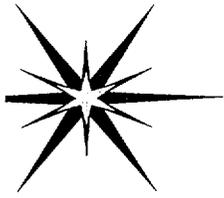
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## **2000 Unit 1 SG Tube Inspection**

**NRC Presentation  
White Flint, Maryland  
February 23, 2000**



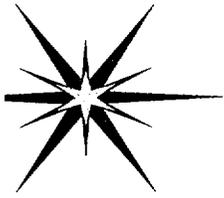
# NRC Meeting Agenda



## Calvert Cliffs Unit 1 Steam Generator Inspection

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- |                                     |             |
|-------------------------------------|-------------|
| <b>1. Introduction</b>              | A. Thornton |
| <b>2. Primary Side Activities</b>   | J. Mate     |
| A. Eddy current inspection scope    |             |
| B. Inspection protocol              |             |
| C. Tube repairs                     |             |
| D. In-Situ Pressure Tests           |             |
| E. Upper Bundle Inspection          |             |
| F. Summary of Examination           |             |
| <b>3. Secondary Side Activities</b> | J. Mate     |
| <b>4. NRC Interactions</b>          | G. Tesfaye  |



# Steam Generator Inspection Team

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## BGE:

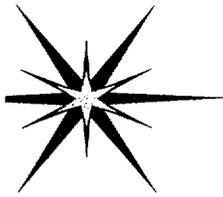
Al Thornton	SG Project Manager
John Haydin	SG System Manager
Joe Mate	SG NDE Engineer
Getachew Tesfaye	SG Regulatory Engineer
Lee Friant, PhD	NDE Level III

## APTECH Engineering:

Primary tube integrity assessment vendor

## Framatome/Rockridge Technologies:

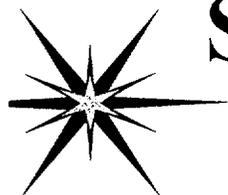
Primary tube inspection and repair vendor



## Background Information

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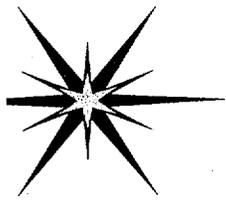
- \* CE Model 67 SGs
  - 8519 tubes per SG
  - tube OD/wall - 0.75"/0.048"
  - tube material - Alloy 600  
HT/MA
  - H/L Tube Plugs - Alloy 690
- \* 17.5 EFPY
- \*  $T_{hot}$  594° F (since start up)
- \* Plugging history
  - SG 11- 604 (7.1%)
  - SG 12 - 776 (9.1%)
- \* SG Replacement on U-1, 2002



## SG Work Scope Objectives

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- \* Maintain SG tube integrity between inspections
- \* Proactively inspect and repair SG tubes
- \* Operate full cycle between inspections
- \* Meet regulatory requirements and commitments
- \* Apply site and industry experience



# Exam Preparations

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- \* **Degradation Assessment**

- site specific degradation
- industry degradation
- eddy current techniques/applicability
- expansion criteria
- repair criteria

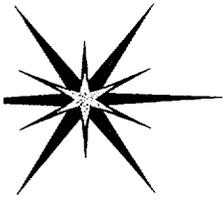
- \* **Site specific analysis guidelines**

- \* **Site specific analysts' exam**

- \* **Free span cracking structural integrity assessment**



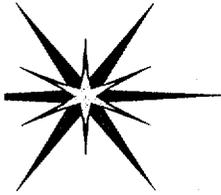
# Examination Philosophy



- 
- \* **Focus Plus Point probe use on areas with the highest potential for structurally limiting degradation**
    - H/L TTS - axial and circ ODSCC
    - Steam blanket region - axial ODSCC (R 6-13)
  
  - \* **Upper bundle free span cracking not a structural threat**
    - degradation morphology
    - pulled tube burst tests
    - in-situ pressure tests



# Eddy Current Exam



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## **Bobbin Exam:**

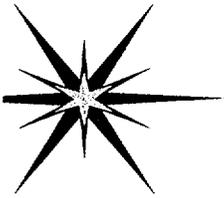
- \* 100% Full Length

## **Plus Point Exam:**

- \* 100% H/L Top of Tubesheet
- \* 100% Steam Blanket
- \* 20% Low Row U-bends
- \* 20% C/L Top of Tubesheet
- \* Upper Bundle -Based on Bobbin Performance



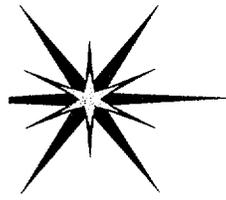
# Expansion Strategy



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**\* Evaluate the need to expand the exam based on the EPRI PWR S/G Examination Guidelines, Rev. 5**

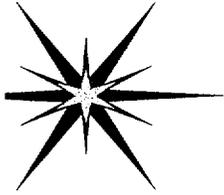
- indication characteristics
- location of indications
- indication density
- metallurgical considerations
- eddy current probe and technique capabilities



# Examination Protocol

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- \* Independent Primary and Secondary Analysis Teams**
- \* Independent Analysts**
- \* All analysts are QDA qualified**
- \* Analyst Performance Tracking and Feedback System**
- \* Primary and Secondary Data Management**

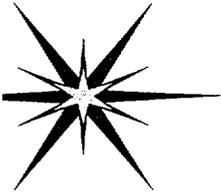


## Tube Repairs

- 
- \* **Repair based on detection or confirmation with a Plus Point Probe**
  - \* **Plus Point Data will be used to disposition all bobbin indications**
  - \* **Repair options:**
    - Tube plugging
    - Alloy 800 Tube Sleeves
  - \* **Stabilizers will be installed in tubes containing circumferential defects or loose part degradation that are not sleeved.**



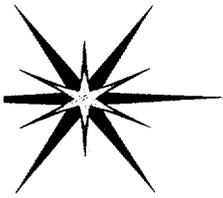
# In-Situ Pressure Tests



- 
- \* **In-Situ pressure testing of SG tubes:**
    - in-situ pressure tests anticipated on 3 - 5 tubes
    - evaluate as-found tube conditions
    - benchmark the performance based tube integrity model
    - tubes selected based on limiting indication characteristics



# Inspection Technology



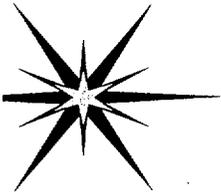
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## **Bobbin Inspection Techniques:**

- \* Maximize bobbin inspection effectiveness**
- \* Utilize low frequency screening to enhance detection**
- \* Bobbin technique PODs used to develop upper bundle inspection strategy**



# Upper Bundle Exam



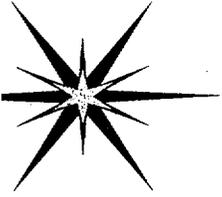
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## Overview

- \* **Maintain acceptable probability of burst safety margin**
- \* **CCNPP SG multi-cycle model**
- \* **Predicts 2000 condition based on previous inspection results**
- \* **Applies site specific PODs**
- \* **Predicts probability of tube burst and leak rate**



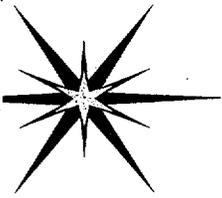
# Upper Bundle Exam



- 
- \* **Unit 1 Steam Generator Mode 1**
    - inspection technique POD is based on CCNPP SG pulled tube data(1996)
    - Bobbin inspection technique POD validated by 1997 Unit 2 and 1998 Unit 1 Plus Point Exams
    - real time validation of inspection predictions



# Examination Summary



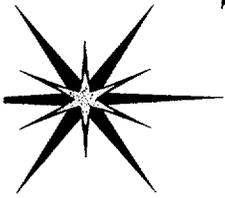
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## **Exam maintains SG tube integrity:**

- \* 100% Plus Point inspection of areas with highest potential for structurally limiting degradation**
- \* Upper bundle approach maintains POB margin:**
  - Extensive 1996 Plus Pt. exam
  - Pulled tube burst pressures
  - Very low probability of burst
  - Use of condition monitoring
- \* Conservative tube repair policy**



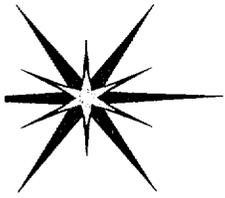
# Secondary Side Activities



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- \* **Steam Generator Internals  
Visual Inspection**

- Inspected in 1996 and 1998 - No degradation found
- No plans to inspect secondary side in the 2000 RFO



# Conclusion

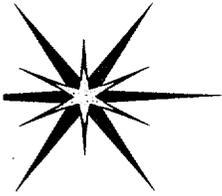
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## **The 2000 SG work scope:**

- maintains CCNPP's focus on nuclear safety
- aggressively identifies and repairs degraded tubes
- provides for inspection scope expansions as necessary to maintain tube integrity
- provides for in-situ tests to validate tube integrity



# NRC Interactions



- 
- \* Maintain open communications with the NRC**
  - \* Brief the NRC Resident Inspector prior to the outage**
  - \* Resident Inspector**
    - access to daily Steam Generator Report**
    - weekly Steam Generator Oversight Committee meetings**
  - \* Follow-up phone call to NRR**