From: "Dotson, Barbara E." <bdotson@entergy.com>
To: "Mahesh Chawla" <MLC@nrc.gov>
Date: 09/21/2007 12:33:33 PM
Subject: FW: Steam Generator Tube Inspection Discussion During Upcoming Palisades Outage

Mac,

The responses are attached. The call-in numbers are below. I may have been incorrect about the Westinghouse generators. Jim says that they are CE, but it's all Westinghouse now.

Phone Number: 1-866-231-9615

Participant Code: 456295

From: Hager, John
Sent: Friday, September 21, 2007 11:56 AM
To: Dotson, Barbara E.
Cc: VanWagner, Robert V.; Fouty, Thomas H.; Higgs, Gregg A.; Rexius, Thomas D.; Cullen, Robert O; Ingram, D urt; MEATHEANY, DANIEL J; O'QUINN, ROBERT C; ADDISON, EDWARD E; 'Cullen, William K.'; 'Spence, William J.'; 'Andy Neff'; 'Michael B Kirk'; Higgs, Gregg A.
Subject: Steam Generator Tube Inspection Discussion During Upcoming Palisades Outage

Barb,

The Palisades' responses to the NRR request for Steam Generator Tube Inspection Discussion During Upcoming Palisades Outage are attached.

John

STEAM GENERATOR TUBE INSPECTION DISCUSSION DURING UPCOMING PALISADES OUTAGE

1. Discuss any trends in the amount of primary-to-secondary leakage observed during the recently completed cycle.

Refer to attached Primary to Secondary Leak Rate for Operational Cycle 19 Primary to Secondary Leak Rate graph.

2. Discuss whether any secondary side pressure tests were performed during the outage and the associated results.

No secondary side pressure tests were performed in the 2007 refueling outage.

3. Discuss any exceptions taken to the industry guidelines.

No exceptions were taken to industry guidelines in the 2007 refueling outage.

4. For each steam generator, provide a description of the inspections performed including the areas examined and the probes used (e.g., dents/dings, sleeves, expansion-transition, U-bends with a rotating probe), the scope of the inspection (e.g., 100% of dents/dings greater than 5 volts and a 20% sample between 2 and 5 volts), and the expansion criteria.

Refer to attached Table 4A Palisades REFOUT 19 SG Eddy Current Inspection Scope for a description of inspections performed, expansion criteria and a description of the probe used for the inspections performed.

5. For each area examined (e.g., tube supports, dent/dings, sleeves, etc), provide a summary of the number of indications identified to-date of each degradation mode (e.g., number of circumferential primary water stress corrosion cracking indications at the expansion transition). For the most significant indications in each area, provide an estimate of the severity of the indication (e.g., provide the voltage, depth, and length of the indication). In particular, address whether tube integrity (structural and accident induced leakage integrity) was maintained during the previous operating cycle. In addition, discuss whether any location exhibited a degradation mode that had not previously been observed at this location at this unit (e.g., observed circumferential primary water stress corrosion cracking at the expansion transition for the first time at this unit).

This response is based on eddy current data collected and analyzed as of 13:00, September 20, 2007.

Tubesheet Region +Pt Program:

Five tubes with sludge pile axial outside diameter stress corrosion cracking (ODSCC), 2 in SG E50A, 3 in SG E-50B. Most significant indication is 0.28 +Pt V in 300 kHz, 0.43 inch. Profile not completed.

Three tubes with circumferential ODSCC, all in SGE-50B. Largest +Pt amplitude is 0.22 V, largest arc length 61 degrees (different indications).

One tube with axial primary water stress corrosion cracking (PWSCC) at ~10 inches below TTS; 0.58 +Pt V, 0.14 inch length.

Three tubes with possible loose part wear signals, minor +Pt amplitudes and lengths.

Tube Supports:

Six tubes in SGE-50A with axial ODSCC at eggcrates. Largest +Pt amplitude 0.33 V in 300 kHz, longest length 0.33 inch. Profile not completed. This is the first report of "true" eggcrate axial ODSCC.

One tube in SG E-50B with axial ODSCC ding crack signal coincident with an eggcrate; bounded by SG E-50A parameters.

No freespan ding cracks are currently reported; this may be due to limited data through resolution process.

One tube in SGE-50B is reported to contain an axial ODSCC indication at a dent at vertical strap VS4. The dent amplitude is 5.11 V. Length is short, 0.20 inch, flaw amplitude is low.

Only one tube in SG-E-50A has been reported to date with a structure wear scar greater than or equal to 40%TW (41%).

Tube structural and leakage integrity was maintained during Operating Cycle 19 based on observed relatively minor flaw parameters reported for 1R19 (2007 refueling outage). All +Pt signal amplitudes for stress corrosion cracking (SSC) are below the EPRI in-situ pressure testing (ISPT) screening value of 0.50 volt for proof testing; all +Pt signal amplitudes for SCC are below the EPRI ISPT screening values for leakage assessment.

6. Describe repair/plugging plans.

Currently there are 11 potential tubes required tube plugging in SG E-50A and 9 potential tubes requiring tube plugging in SG E-50B.

All stress corrosion cracking (SCC) indications are plugged. All circumferential SCC indications near top of tubesheet (TTS) are stabilized and plugged.

All structure wear greater than or equal to 40%TW is plugged.

7. Describe in-situ pressure test and tube pull plans and results (as applicable and if available).

Based on the available data to date, no tubes require in-situ pressure testing.

8. Provide the schedule for steam generator-related activities during the remainder of the current outage.

Currently bobbin and top of tubesheet +Pt RPC are almost completed in both steam generators. Special interest is in progress and will be completed this weekend in both steam generators (this includes dings/dents, u-bend, cold leg top of tubesheet etc.).

Sludge lancing and batwing inspections are completed on SG E-50A. Foreign object search and retrieval (FOSAR) in progress. SG E-50B sludge lancing/FOSAR has not started but will commence after FOSAR is completed in SG E-50A.

Tube plugging will occur early next week.

9. Discuss the following regarding loose parts:

* What inspections are performed to detect loose parts?

The hot leg top of tubesheet (TTS) region is inspected with +Pt up to 3 inches above TTS. A similar inspection is performed for the cold leg TTS region (3 tubes deep along periphery and tube lane. Foreign object search and retrieval (FOSAR) is performed for the periphery, tube lane annulus, and stay cavity areas.

* A description of any loose parts detected and their location within the SG

FOSAR is in progress in SG E-50A and sludge lancing/FOSAR has not started in SG E-50B.

* If the loose parts were removed from the SG

FOSAR is in progress in SG E-50A and sludge lancing/FOSAR has not started in SG E-50B.

* Indications of tube damage associated with the loose parts

One tube in SG E-50B R137 C92 is reported to contain two volumetric signals at approximately 12 inches above TTS. This location is on the hot leg periphery.

Bobbin analysis reported two NQI signals. The axial and circumferential extents are bounded by 0.23 inch and 56 degrees arc. Eddy current analysis suggests the part is no longer present. All surrounding tubes are scheduled for +Pt inspection to a height greater than the indications. FOSAR will examine the area, if possible.

One tube in SGE-50B R3 C58 is reported to contain a volumetric indication at tubesheet hot (TSH). A possible loose part (PLP) signal is reported for location in SG E-50A at R3 C60. Axial and circumferential extents are similar to those for SG E-50A R137 C92 (but not related).

One tube SG E-50A R117 C66 is reported to contain a volumetric indication at TSH. Axial and circumferential extents are similar to indications discussed above. Modest +Pt amplitude could produce depth of approximately 30%TW. All surrounding tubes were reevaluated; no PLP signals in adjacent tubes.

* The source or nature of the loose parts if known

Cannot be determined at this point in time.

10. Discuss the results of any secondary side inspections.

Batwing inspection completed on SG E-50A/B –no broken batwings identified FOSAR is in progress in SG E-50A and sludge lancing/FOSAR has not started in SG E-50B.

11. Discuss any unexpected or unusual results.

Steam Generator E-50A has identified a new damage mechanism which is axial outside diameter stress corrosion cracking (ODSCC) in eggcrates. Per the Steam Generator Program this has been documented in a condition report CR-PLP-2007-04250.

Upon opening of the hot leg manway, water was observed flowing from the cold leg channel head to the hot leg channel head at the lowest point of the divider plate. This was documented in condition report CR-PLP-2007-03956. Videos were taken of the divider plate from both the hot and cold legs. No abnormalities were observed. The design allows for a 12 mill gap and leakage would be expected per our design. The Combustion Engineering steam generator divider plate design does not have welded connections between the divider plate and channel head/tubesheet. The design includes a divider bar, which is welded to the channel head. The divider bar mates with the divider plate by a tongue-in-groove connection and is held in place via set screws all of which are accounted for.

Primary to Secondary Leakrate

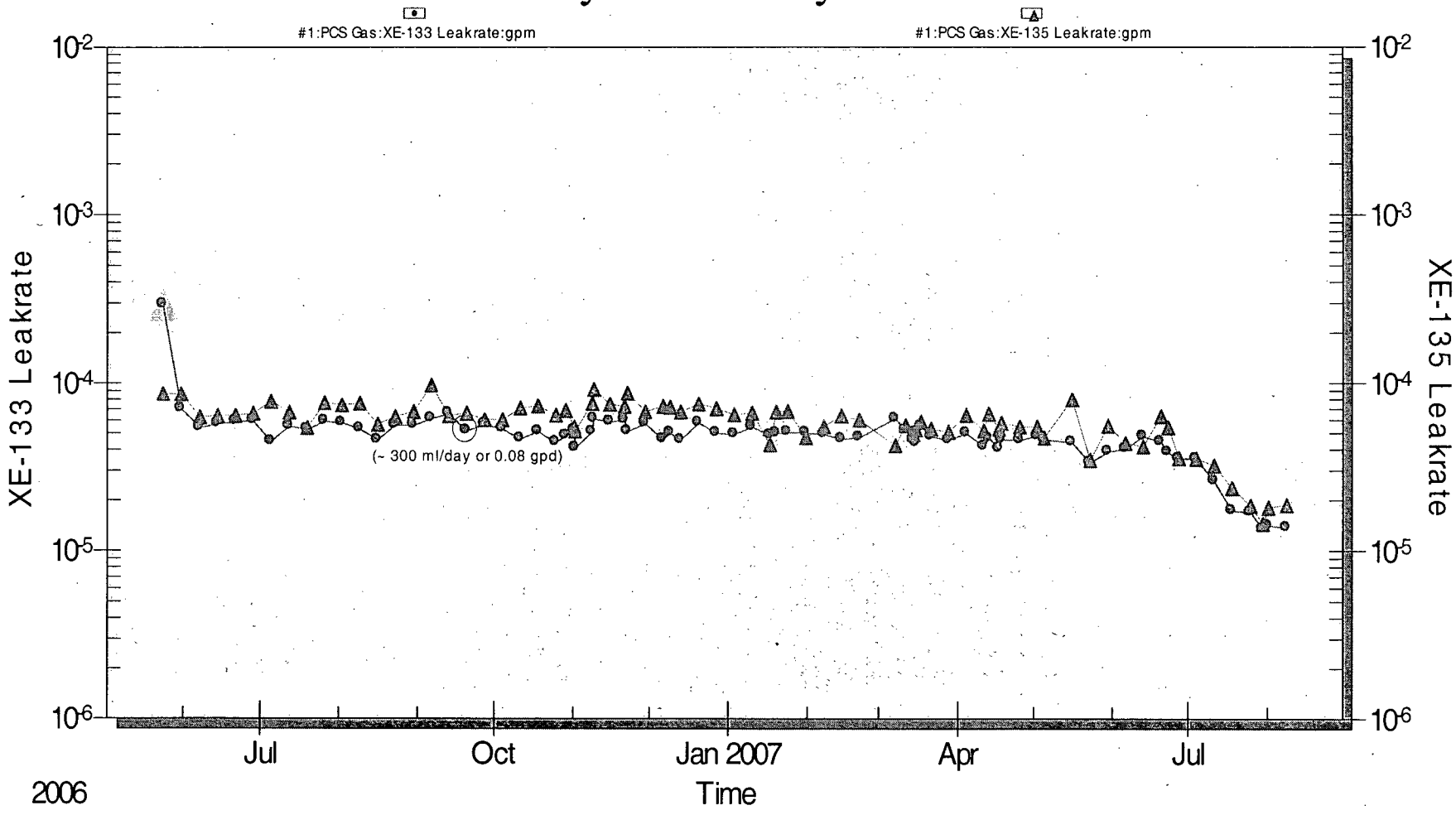

Table 4A Palisades REFOUT 19 SG Eddy Current Inspection Scope				
Mechanism	Location	Scope	Detection Probe	Confirmation Probe
Existing and Potential Degradation Mechanisms				
Axial and Circumferential ODSCC	Expansion transition and sludge pile	100% hot leg from 3" above to 13.5" below TTS	+Pt	N/A
Axial and Circumferential PWSCC	Expanded tube in tubesheet	100% hot leg from 3" above to 13.5" below TTS	+Pt	N/A
Axial and Circumferential PWSCC	Small radius U-bends	100% Row 1 – 3 U-bends	+Pt	N/A
Axial ODSCC	Non-dented structures	100% Full length	Bobbin	+Pt
	Freespan	100% Full length	Bobbin	+Pt
	Freespan Dings <5V	100% Full length	Bobbin	+Pt
	Freespan Dings >5V	100% >5V dings	+Pt	N/A
	Eggcrate Dents >2V	100%	+Pt	N/A
	VS, DB Dents >3.5V	100%	+Pt	N/A
Wear	Eggcrates, Vertical Straps, Diagonal Bars	100%	Bobbin	+Pt
	TTS (foreign objects)	100% hot leg, 3 tubes deep cold leg periphery	+Pt	N/A
	Freespan (foreign objects)	100%	Bobbin	+Pt
Pitting	Sludge Pile	100% Full length	Bobbin	+Pt
Non-Relevant Degradation Mechanisms Addressed by Inspection Program				
Axial PWSCC	Dented structures	100% eggcrate dents >2V 100% VS, DB dents >3.5V	+Pt	N/A
Circumferential ODSCC	Dented structures	100% eggcrate dents >2V 100% VS, DB dents >3.5V	+Pt	N/A
Axial ODSCC	Structure wear sites	25% VS, DB historic wear sites	+Pt	N/A

Special Interest +Pt Testing:

- All newly reported bobbin signals at vertical straps and diagonal bars
- "Boxing" of PLP and freespan SVI signals
- Any freespan bobbin signal exhibiting change from prior inspections
- Any freespan bobbin NQI or DNI signal
- Any bobbin signal reported at an eggcrate
- Any bobbin wear signal >40%TW