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

January 5, 2011

Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: SUMMARY OF CONFERENCE CALL WITH PALISADES NUCLEAR PLANT REGARDING THE FALL 2010 STEAM GENERATOR INSPECTIONS (TAC NO. ME4671)

Dear Sir:

On October 15, 2010, the U.S. Nuclear Regulatory Commission (NRC) staff participated in a conference call with representatives of Entergy Nuclear Operations, Inc. (the licensee) regarding the steam generator (SG) inspection activities at Palisades Nuclear Plant. On September 9, 2010, the licensee was provided with the list of questions (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102560350), to discuss the ongoing results of the SG tube inspections prior to completion of the inspections and repairs conducted during the Palisades Nuclear Plant refueling outage. The information provided by the licensee in support of the teleconference is part of the enclosed conference call summary.

Based on the information provided by the licensee, the NRC staff did not identify any issues that warranted immediate follow up action. However, the staff asked to be notified in the event that any unusual conditions were detected during the remainder of the outage. If you have any questions regarding this matter, I may be reached at 301-415-8371.

Sincerely,

Mahesh Chawla, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:
Conference Call Summary

cc: Distribution via ListServ

CONFERENCE CALL SUMMARY
PALISADES NUCLEAR PLANT FALL 2010 (1R21) OUTAGE STEAM GENERATOR INSPECTIONS

On October 15, 2010, the staff of the Steam Generator Tube Integrity and Chemical Engineering Branch of the Division of Component Integrity participated in a conference call with Entergy Nuclear Operations, Inc. (the licensee) regarding the ongoing steam generator (SG) inspection activities at Palisades Nuclear Plant.

Palisades Nuclear Plant has two Combustion Engineering Model 2530 replacement SGs. There are 8,219 mill-annealed Alloy 600 tubes in each SG. The tubes have a nominal outside diameter of 0.75 inches and a nominal wall thickness of 0.042 inches. The tubes are supported at various locations by stainless steel eggcrate lattice type tube supports, diagonal straps and vertical straps. The tubes were expanded through the full depth of the tubesheet using an explosive process.

Additional clarifying information or information not included in the document provided by the licensee is summarized below.

The licensee noted that this was the first outage where they applied the criteria from Appendix I of the Electric Power Research Institute (EPRI) Steam Generator Examination Guidelines. The licensee stated that Appendix I oversized the outside diameter stress corrosion cracking (ODSCC) indications by 15-20 percent. The licensee further noted that the three tubes that were identified for in-situ testing would not have required in-situ testing if the criteria from Appendix H of the EPRI SG Examination Guidelines had been used.

At the time of the call, the licensee was evaluating whether they would perform the in-situ testing at three times the normal operating differential pressure ($3\Delta P$) or at a pressure greater than $3\Delta P$, due to sizing uncertainties.

After the call, the licensee informed the Nuclear Regulatory Commission of the results of the in-situ testing. The licensee successfully tested the three tubes to pressures above that required by EPRI guidelines (e.g. $3\Delta P$ = 4475 pounds per square inch (psi)).

SG B: Tube 75, 96 to 5650 psi no break or leak.

SG A: Tube 9, 150 to 5650 psi no break or leak;
Tube 4, 59 to 5650 psi no break or leak

The staff did not identify any issues that required follow-up action; however, the staff asked to be notified in the event that any unusual conditions were detected during the remainder of the outage.

STEAM GENERATOR TUBE INSPECTION DISCUSSION DURING PALISADES 2010 (1R21) 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 21 Primary to Secondary Leak Rate graph. Leakage has been minimal all cycle.

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 2010 refueling outage (1R21).

3. Discuss any exceptions taken to the industry guidelines.

   No exceptions were taken to industry guidelines in the 2010 refueling outage (1R21).

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 percent of dents/dings greater than 5 volts and a 20 percent sample between 2 and 5 volts), and the expansion criteria.

   Refer to attached Table 4-2 Palisades REFOUT 21 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).

As of 10/14/2010, (INDICATIONS)

SG	Location	Type	Number		
A	TSH	Axial ODSCC	3		
A	TSH	Axial PWSCC	1		
A	TSH	Circ PWSCC	5		
A	TSH	Circ ODSCC	6		
A	TSH	Wear	2		
			17	Total	
SG	Location	Type	Number		
B	TSH	Axial ODSCC	12		
B	TSH	Axial PWSCC	0		
B	TSH	Circ PWSCC	0		
B	TSH	Circ ODSCC	0		
B	TSC	Wear	2		
			14	Total	
SG	Location	Type	Number		
A	Tube Supports	Axial ODSCC	30		
A	Tube Supports	Wear	2		
			32	Total	
SG	Location	Type	Number		
B	Tube Supports	Axial ODSCC	18		
B	Tube Supports	Wear	3		
B	Freespan	Axial ODSCC	1		
			22	Total	
	Total Indications*		85	Grand Total	

* Some tubes have multiple indications

Tubesheet and Sludge Pile

Most significant axial ODSCC indication is 0.63V from +Pt in 300 kHz channel (69 percent TW using ETSS I28432 method, 55 percent TW using an amplitude regression based on C-E pulled

tube data). Longest length reported from resolution analysis is 0.80 inch (same indication). Indication length from profile for this indication is 0.70 inch.

All circumferential ODSCC indications are less than 100 degrees total flaw arc length. Maximum depth from phase analysis is <50 percent TW.

All PWSCC indications have classified as minor with the largest +Pt amplitude is 1.06V.

Supports

Largest P4 (300/100 kHz mix channel) +Pt amplitude is 0.51V. Several indications have total flaw length approaching 2 inches (contact length of eggcrate). Average flaw length is 0.53 inch.

Freespan

One tube reported to contain axial ODSCC at a freespan ding. Ding voltage is 2.4 volts, indication was reported by bobbin.

U-Bends

One Row 2 tube in SG E-50B is reported to contain axial ODSCC at a ding.

6. Describe repair/plugging plans.

   Currently there are 48 potential tubes requiring tube plugging in SG E-50A and 31 potential tubes in SG E-50B.

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

   All structure wear greater than or equal to 40 percent TW will be 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, three tubes will require insitu testing.

SG	Tube Number	Location	Depth	Length	Voltage
SGA	R9C150	02H Eggcrate	60%	2.00	0.44
SGA	R4C59	01H Eggcrate	64 %	1.98	0.47
SGB	R75C96	Hot Leg Sludge Pile	68%	0.70	0.63

8. Discuss the following regarding loose parts:

   - What inspections are performed to detect loose parts?

The hot-leg 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

Loose parts verified with wear in SGA – HL 129-62 and 131-62 and SGB – CL 110-35 and 111-36 TSC

PLP E-50A 171 PLP Calls in 144 Tube Locations
E-50B 105 PLP Calls in 105 Tube Locations

- If the loose parts were removed from the SG

FOSAR is scheduled in SG E-50A for 10/18/2010 and in SG E-50B on 10/17/2010.

- Indications of tube damage associated with the loose parts

Currently there are 2 locations that have indication of wear associated with a loose part. Loose parts verified with wear in:

SGA – HL 129-62 and 131-62 and
SGB – CL 110-35 and 111-36 TSC

9. Discuss the scope and results of any secondary side inspection and maintenance activities (e.g., in-bundle visual inspections, feedring inspections, sludge lancing, assessment deposit loading, etc).

Visual inspection scheduled both SG E-50A and SG E-50B tubesheet periphery regions and in bundle top of hot and cold-leg tubesheets, FOSAR and sludge lancing the top of cold and hot-leg tubesheets.

10. Discuss any unexpected or unusual results.

There are three indications that will need to be in-situ tested.

The need for in-situ pressure testing has been entered into the Entergy Corrective Action Program. CR-PLP-2010-04929 for SG B and CR-PLP-2010-05055 for SG A.

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

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

SG E-50 A and B FOSAR and sludge lancing will also be started early next week.

Tube plugging will start as early as 10/15 and in-situ testing on 10/16.

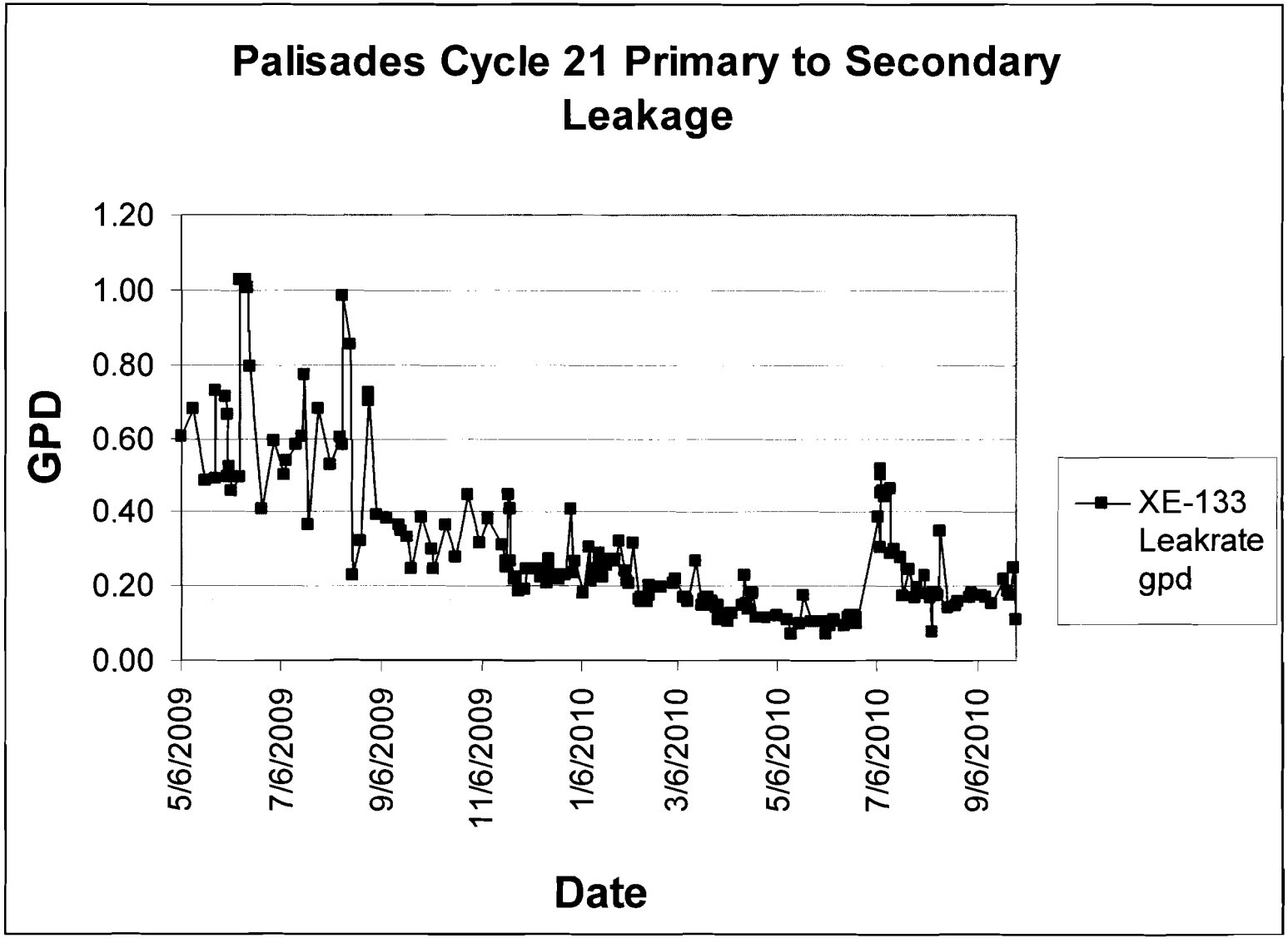
Palisades Cycle 21 Primary to Secondary Leakage
GPD
1.20
1.00
0.80
0.60
0.40
0.20
0.00
5/6/2009
7/6/2009
9/6/2009
11/6/2009
1/6/2010
3/6/2010
5/6/2010
7/6/2010
9/6/2010
Date
XE-133 Leakrate gpd

Table 4-2. Summary of SG Tube Degradation Mechanisms and Inspection Requirements: Palisades 1R21				
Degradation Mechanism	**Location**	**Probe Type**	**Detection Inspection/Expansion Plan**	
			Inspection Sample Plan	**Expansion Plan**
Existing Degradation Mechanisms				
Tube Wear	Non dented Tube Support Structures	Bobbin	100% vertical straight length Rows 1 thru 3, 100% full length Rows 4 and higher, both SGs	N/A
Axial ODSCC	Non dented Tube Support Structures	Bobbin	100% vertical straight length Rows 1 thru 3, 100% full length Rows 4 and higher, both SGs	N/A
		Plus Point	100% all DSI or %TW signals at eggcrates, 100% newly reported bobbin signals between DBH and DBC inclusive	100% historical wear sites between DBH and DBC for confirmation of ODSCC at historical wear site not previously RPC tested.
Axial ODSCC	Freespan, Freespan dings ≤5V	Bobbin	100% vertical straight length Rows 1 thru 3, 100% full length Rows 4 and higher, both SGs	N/A
		Plus Point	100% all bobbin I-codes	N/A
Axial ODSCC	Freespan dings >5V	Plus Point	100% dings >5V in both SGs, all elevations and locations	N/A
Axial ODSCC	Dented eggcrates, diagonal bars, vertical straps >2V	Plus Point	100% dented eggcrates, diagonal bars, vertical straps >2V	N/A
Circumferential and Axial ODSCC	HL TTS expansion transition and sludge pile	Plus Point	100% from 3" above to 12.5" below expansion transition, both SGs	See Note (1).
Axial PWSCC	HL TTS expansion transition and expanded tubesheet	Plus Point	100% from 3" above to 12.5" below expansion transition, both SGs	See Note (1)
Axial PWSCC	Row 1, 2, and 3U-bends	Plus Point	100% Row 1, 2, and 3 U-bends using mid-range coil (2)	100% of Row 4 for indication in Row 3. Redefine plan if indications detected in Row 4.

Table 4-2. Summary of SG Tube Degradation Mechanisms and Inspection Requirements: Palisades 1R21				
Degradation Mechanism	**Location**	**Probe Type**	**Detection Inspection/Expansion Plan**	
			Inspection Sample Plan	**Expansion Plan**
Tube Wear	Dented Vertical Straps, Diagonal Bars and Eggcrates, ≤5V	Bobbin: 0.610" diameter	100% vertical straight length Rows 1 thru 3, 100% full length Rows 4 and higher, both SGs (active mechanism dictates plan)	N/A
	Dented Vertical Straps, Diagonal Bars and Eggcrates, >5V	Plus Point: 0.610"/0.580" diameter	100% >2V dents will be performed as part of ODSCC inspection plan	N/A
Tube Wear (freespan)	Square bend region	Bobbin	100% vertical straight length Rows 1 thru 3, 100% full length Rows 4 and higher, both SGs (active mechanism dictates plan)	N/A
		Plus Point	Highest eggcrate through square bend, tubes surrounding R99 C140 in SGB	N/A
Tube Wear (loose parts)	TTS periphery, tube lane	Bobbin	100% full length bobbin +FOSAR in both SGs	Plus Point all surrounding tubes with loose part or loose part wear signals
		Plus Point	100% hot-leg TTS region plus 3 tube deep on cold leg periphery from 2" above to 2" below TTS, plus special interest testing of PLP signals from bobbin in freespan, at eggcrates, and vertical straps, diagonal bars	Plus Point all surrounding tubes with loose part or loose part wear signals
Resolution for Classification of Indications				
Potential MBMs	All	Bobbin	100% vertical straight length Rows 1 thru 3, 100% full length Rows 4 and higher, both SGs	N/A
		Plus Point	Flaw confirmation of bobbin indications with change or no history	Review specific occurrences of flaw detection and establish expansion plan based on observed parameters

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Degradation Mechanism	**Location**	**Probe Type**	**Detection Inspection/Expansion Plan**	
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To Be Defined	Bobbin Signals at Suspected Wear Sites not yet characterized	Plus Point	25% historical DB and VS wear sites	100% DB and VS wear sites in both SGs for detection of ODSCC
Potential Degradation Mechanisms				
Circ PWSCC	Row 1and 2 U-bends in both SGs	Plus Point	100% Row 1, 2, and 3 U-bends in both SGs using mid-range coil (2)	100% of Row 4 for indication in Row 3. Redefine plan if indications detected in Row 4.
Circ PWSCC	HL TTS expansion transition and expanded tubesheet	Plus Point	100% from 3" above to 12.5" below expansion transition, both SGs	See Note (1).
Circ ODSCC	Dented Vertical Strap Locations	Plus Point	Controlled by inspection requirements for existing or potential mechanisms, PLUS tube locations listed in Section 4.5, item 5	100% all dings/dents for confirmation of circ ODSCC
Pitting	Sludge pile	Bobbin	Controlled by inspection requirements for existing or potential mechanisms	N/A
Non-Relevant Degradation Mechanisms Included in the 1R21 Eddy Current Inspection Scope				
Axial PWSCC	Dented support structures	Plus Point	Controlled by inspection requirements for existing or potential mechanisms	100% all dings/dents for confirmation of axial PWSCC
Axial and Circ PWSCC	Cold-leg expanded tube in tubesheet	Plus Point	3 tubes deep on cold-leg periphery from 2" above to 2" below TTS (controlled by loose part detection program)	100% cold-leg from 2" above to 13 inches below TTS
Axial ODSCC	Wear sites	Bobbin	Controlled by inspection requirements for existing or potential mechanisms	N/A
		Plus Point	25% historical wear sites between DBH and DBC	100% all wear sites between DBH and DBC for confirmation of combined mode axial ODSCC + wear scar

(1) 20 percent cold-leg TTS Plus Point expansion at either 1R21 or 1R22 from 3" above to 12.5" below bottom of expansion transition in SG with C-3 condition or if failure of performance criteria at TTS is determined.

(2) Any Row 1 or Row 2 U-bend with mid-range +Pt coil noise exceeding the value specified in Appendix B will be tested with a high frequency +Pt coil probe.

January 5, 2011

Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
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/RA/
Mahesh Chawla, Project Manager
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ADAMS Accession No:ML103640046 *Memo dated November 10, 2010 from R Taylor to R Pascarelli

OFFICE	NRR/LPL3-1/PM	NRR/LPL3-1/LA	NRR/CSGB/BC*	NRR/LPL3-1/BC
NAME	MChawla	BTully	RTaylor	RPascarelli
DATE	1 /05 /11	1 /05 /11	1 /05 /11	1 /05/11

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