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

June 21, 2012

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

SUBJECT: PALISADES NUCLEAR PLANT – SUMMARY OF CONFERENCE CALL REGARDING THE SPRING 2012 STEAM GENERATOR INSPECTIONS (TAC NO. ME8129)

Dear Sir or Madam:

On April 23, 2012, the staff of the Nuclear Regulatory Commission (NRC) participated in a conference call with representatives of Entergy Nuclear Operations, Inc. (the licensee) regarding the ongoing steam generator (SG) inspection activities at Palisades Nuclear Plant. In support of the conference call, the licensee provided the document attached to the enclosed conference call summary. The NRC staff formally reviews all SG inspection summary report(s) submitted by licensees in accordance with the plant's technical specification (TS) requirements. The licensees submit the summary report(s) following the completion of the SG tube inspections at a frequency defined by their TSs. Attached enclosure provides the results of the NRC staff summary of the subject inspection activities.

The staff did not identify any issues that required follow-up action at this time; 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 further questions or concerns, you can contact me at 301-415-8371 or Mahesh.chawla@nrc.gov.

Sincerely,

Chawla

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 w/encl: Distribution via ListServ

CONFERENCE CALL SUMMARY

PALISADES NUCLEAR PLANT SPRING 2012 (1R22) OUTAGE STEAM GENERATOR INSPECTIONS

On April 23, 2012, the staff of the Steam Generator Tube Integrity and Chemical Engineering Branch of the Division of Engineering 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.

- Secondary side inspection activities included removal of some chevron dryers.

- The staff asked if the old sizing methods had been used to size the axially oriented outside diameter stress corrosion cracking whether the results of the condition monitoring would be different. The licensee indicated that one indication would be close to the condition monitoring limit (0.5 inches long, 60 percent through wall); however, indications more severe than this had been successfully in-situ pressure tested in prior outages at pressures about 1000 pounds per square inch greater than the three times normal operating differential pressure. As a result, no change in the Condition Monitoring results were expected.

The staff did not identify any issues that required follow-up action at this time; however, the staff asked to be notified in the event that any unusual conditions were detected during the remainder of the outage. The staff had provided some feedback to the licensee regarding their deviation to the industry guidelines (see attached for a discussion on the deviation which is related to the method used to size axially oriented outside diameter stress corrosion cracking). Additional discussion may be warranted regarding this deviation.

Enclosure

STEAM GENERATOR TUBE INSPECTION DISCUSSION DURING PALISADES 2012 (1R22) 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 22 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 2012 refueling outage (1R22).

3. **Discuss any exceptions taken to the industry guidelines.**

Palisades has submitted this deviation to the NRC: Technical Justification Supporting Deviation from the EPRI Appendix I ETSS for ODSCC Sizing

Palisades will deviate from the "needed" requirement to use an approved Examination Technique Specification Sheet (ETSS) contained in The "EPRI PWR Steam Generator Examination Guidelines – Revision 7", Section 6.2 for ODSCC sizing. Palisades will instead use a modified ETSS for ODSCC. The modified ETSS will be identical to the ETSS approved per Appendix I of the examination guidelines with the exception that only the sub-set of data from CE plants will be used instead of the combined fleet data set used in the approved ETSS.

A comprehensive review of axial ODSCC in Palisades steam generators shows that Appendix I28432 over sizes maximum depth values for axial ODSCC at Palisades. There is a reasonable basis to submit a deviation request for maximum depth sizing of axial ODSCC indications at Palisades. The request is relatively modest since it uses the Combustion Engineering (CE) subset of the well vetted data of Appendix I28432. The regression slope and standard error of regression are retained. Only the intercept parameter is changed. This provides an across the board reduction of NDE maximum depth sizing of 11.23% TW. This will lead to about a 1000 psi increase in calculated condition monitoring burst pressures and much better matching of projected and measured NDE maximum depths.

The deviation will be in effect starting in the 2012 (1R22) refueling outage steam generator inspection for the remaining life of the existing Palisade steam generators.

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.

Attachment

Refer to attached 2012 Steam Generator Degradation Assessment Summary Table 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 4/22/2012, (INDICATIONS)

SG	Location	Type	Number		
A	TSH	Axial ODSCC	6		
A	TSH	Axial PWSCC	0		
A	TSH	Circ PWSCC	0		
A	TSH	Circ ODSCC	3		
A	TSH	Wear	0		
			9	Total	
SG	Location	Type	Number		
B	TSH	Axial ODSCC	4		
B	TSH	Axial PWSCC	0		
B	TSH	Circ PWSCC	0		
B	TSH	Circ ODSCC	1		
B	TSC	Wear	0		
			5	Total	
SG	Location	Type	Number		
A	Tube Supports	Axial ODSCC	29		
A	Tube Supports	Wear	2		
			31	Total	

SG	Location	Type	Number		
B	Tube Supports	Axial ODSCC	6		
B	Tube Supports	Wear	0		
B	Freespan	Axial ODSCC	1		
			7	Total	
	Total Indications*		52	Grand Total	

* Some tubes have multiple indications

Tubesheet and Sludge Pile

The most significant axial ODSCC indication is 0.71V using the +Point 300 kHz channel (61% TW using the regression method). The longest length reported from resolution analysis is 0.58 inches (same indication). This indication's profiled length and depth is 0.48 inches and 49% TW respectively.

All circumferential ODSCC indications are less than 110 degrees total flaw arc length. The maximum depth from phase analysis is 77% TW.

Supports

The largest P4 (300/100 kHz mix channel) +Point amplitude is 0.61V. Several indications have flaw lengths exceeding 1 inch but none greater than 2 inches (contact length of eggcrate). The average flaw length is 0.65 inches.

Freespan

One tube is reported to contain axial ODSCC at a freespan ding. The ding voltage is less than the bobbin reporting voltage of 2.0V. The indication was reported by bobbin.

U-Bends

Nothing to report.

6. Describe repair/plugging plans.

Currently there are **37** potential tubes requiring tube plugging in SG E-50A and **12** potential tubes in SG E-50B.

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

All wear indications (at support structures) greater than or equal to 40% 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, no tubes will require in-situ pressure testing.

8. Discuss the following regarding loose parts:

- **What inspections are performed to detect loose parts?**

The hot leg top of tube sheet (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**

As of 4/22/2012 at 1300 hours, the following are the number of potential loose parts identified with the plus point inspection:

E-50A 198 PLP Calls in 176 Tube Locations (30 are new)
E-50B 96 PLP Calls in 86 Tube Locations (11 are new)

The majority of the indications is historical and has not changed. The new indications are predominantly in the center of the bundle. It should be noted that the plus point examination is not complete at this time. These numbers are consistent with last outage.

- **If the loose parts were removed from the SG**

SG E-50A

It is anticipated that FOSAR will start in SG E-50A on 4/23/2012.

SG E-50B

FOSAR was performed initially on SG E-50B on 4/21/2012. Once the plus point inspection is complete, additional inspections may be required. Three specific areas were inspected in detail due to the location of the PLP and its history. One part at location R101C28 was removed which was a piece of weld slag. There was no wear associated with this part and was approximately 0.25 inches by 0.25 inches and round in shape. Additionally at this location there was a sludge rock and what appears to be a wire screen. Both were attempted to be removed without success. A second and third location was visually inspected with no parts being identified.

The visual inspection was performed around the periphery of both the hot leg and cold leg and along both sides of the tube lane approximately 3 tubes deep.

- **Indications of tube damage associated with the loose parts**

Currently there are no PLP indications in either generator that also have wear.

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 foreign object search and retrieval (FOSAR) of the top of cold and hot leg tubesheets. Visual inspection and FOSAR has been completed on SG E-50B

SG E-50B only is scheduled for visual inspection above the moisture separator can deck will include the inspections above the dryer deck, the steam separator cans and the feedwater ring.

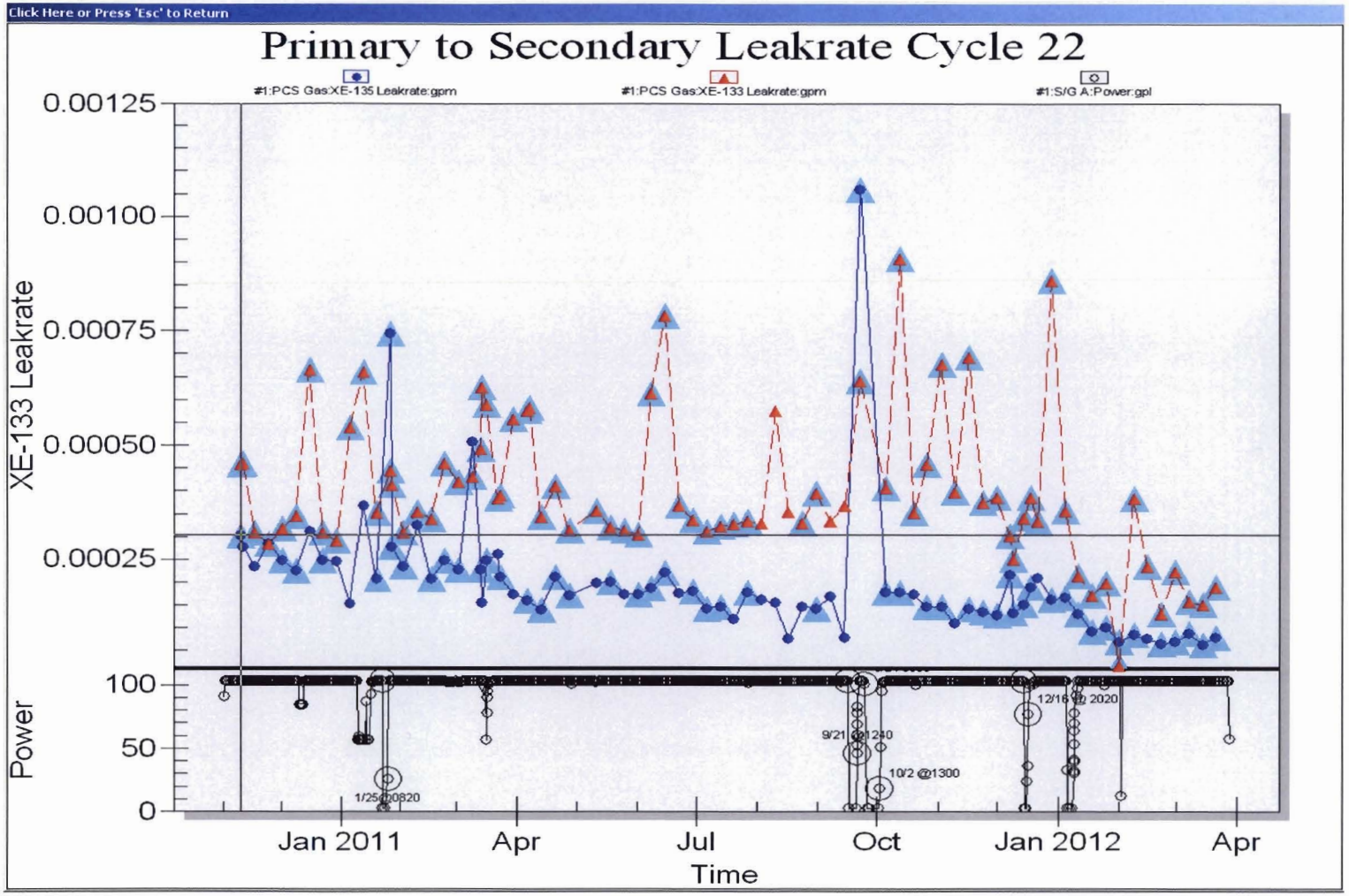
10. Discuss any unexpected or unusual results.

Currently no unexpected or unusual results. Currently there are no tubes that have failed the screening criteria requiring in-situ pressure testing

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 steam generators. Special interest is in progress and will be completed by April 24th in both steam generators (this includes dings/dents, u-bend, cold leg top of tubesheet, eggcrate etc.). Tube plugging will start as early as April 24th.

SG E-50A foreign object search and retrieval (FOSAR) will start when tagging is available. SG E-50B secondary side inspection will start after hand holes have been installed and steam generator is filled to the feedring to provide shielding on April 24th.


Click Here or Press 'Esc' to Return
Primary to Secondary Leakrate Cycle 22
#1:PCS Gas:XE-135 Leakrate:gpm
#1:PCS Gas:XE-133 Leakrate:gpm
#1:S/G A:Power:gpl
0.00125
0.00100
0.00075
0.00050
0.00025
XE-133 Leakrate
100
50
0
Power
1/25 @0820
9/21 @1240
10/2 @1300
12/16 @ 2020
Jan 2011
Apr
Jul
Oct
Jan 2012
Apr
Time

2012 Steam Generator Degradation Assessment Summary Table

Damage Mech.	Location	E/P D/C/S	Probe/ ETSS	CMOA	Regression/ POD	Scope	Expansion/ Comments
Wear	Eggcrates DB/VS	E/D/S	Bobbin/ 96004.1 R13	CMOA	Depth = 0.98*NDE + 2.89 Sy,x = 4.19 N = 76, R = 0.98	100% Bobbin except Row 1-3 U-bends.	+Point all New Wear +Point all Bobbin I-Codes
		E/D/S	+Point 300/100 10908.4	CMOA	Depth = 1.06*NDE + 0.13 Sy,x = 3.78 N = 49, R = 0.99	+Point Row 1-3 U-bends.	
		P/D	+Point / CDME-07-119	None	Technique to determine if (Wear+ODSCC) are coincident.	+Point All Eggcrate Wear and 25% of DB/VS Wear not previously inspected for presence of ODSCC.	If ODSCC is coincident with DB/VS wear, then +Point all DB/VS wear in the affected SG.
	Dented DB < 5Vpp Dented VS < 3.5Vpp	E/D	Bobbin/ TRC-1708	None	Technique to determine if (Dent+Wear) are at the same axial location.	100% Bobbin except Row 1-3 U-bends.	+Point all bobbin I-codes (dents >2V will already be spun from ODSSS scope).
		E/D	+Point / CDME-07-119	None	Technique to determine if (Dent+Wear) are coincident.	+Point Row 1-3 U-bends.	
		E/S	+Point 300/100 10908.4	CM	Depth = 1.06*NDE + 0.13 Sy,x = 3.78 N = 49, R = 0.99	+Point all (Dent+Wear) for sizing of Wear.	If wear can not be sized (depth or voltage), then in-situ testing will be required
	Dented DB > 5Vpp Dented VS > 3.5Vpp	E/D	+Point / CDME-07-119	None	Technique to determine if (Dent+Wear) are at the same axial location.	Apply this technique to applicable Dent/ Dings detected with Bobbin	dents >2V will already be spun from ODSSS scope
		E/S	+Point 300/100 10908.4	CMOA	Depth = 1.06*NDE + 0.13 Sy,x = 3.78 N = 49, R = 0.99	+Point all (Dent+Wear) for sizing of Wear.	If wear can not be sized (depth or voltage), then in-situ testing will be required
	Tube to Tube Contact Wear	E/D	Bobbin/ 96004.1 R13	CMOA	Depth = 0.98*NDE + 2.89 Sy,x = 4.19 N = 76, R = 0.98	100% Bobbin except Row 1-3 U-bends.	+Point all New Wear +Point all Bobbin I-Codes
		E/D/S	+Point 300/100 10908.4	CMOA	Depth = 1.06*NDE + 0.13 Sy,x = 3.78 N = 49, R = 0.99	+Point Row 1-3 U-bends. +Point highest eggcrate through the square bend for the tubes surrounding R99 C140 in SGB	
	Loose Part Wear	E/D	Bobbin/ 27091.2 R0	CM	This technique can be used for depth sizing; however, the +Point yields better results.	100% Bobbin. + FOSAR Both SGs.	+Point all bounding tubes with loose part wear or loose part indication or visually detected loose part
		E/S	+Point	CMOA/	Sizing will be based on the	27091.1 thru 27097.1 when loose part not present (CMOA)	

Damage Mech.	Location	E/P D/C/S	Probe/ ETSS	CMOA	Regression/ POD	Scope	Expansion/ Comments
			27091.1-27097.1 96910.1	CM	+Point technique selected to match the loose part geometry	96910.1 when loose part present (CM)	

Damage Mech.	Location	E/P D/C/S	Probe/ ETSS	CMOA	Regression/ POD	Scope	Expansion/ Comments
Axial ODSCC	Non-dented and ≤ 2Vpp Dented Eggcrates DB/VS Freespan Using Bobbin Probe	E/D	Bobbin/ I28413 R3	None	POD: Log-Logistic Slope = 4.296 Intercept = -5.679	100% Bobbin except Row 1-3 U-bends.	+Point all Bobbin I-Codes
		E/C	+Point / I28425 R3	None	POD: Log-Logistic Slope = 6.7176 Intercept = -9.146	+Point confirmation of all Bobbin I-Codes	
		S	+Point / I28432 R2	CM	BED = 0.972*NDE + 3.698 Sy,x = 12.153 N = 676, R = 0.859 BEL = 0.516*NDE + 0.208 Sy,x = 0.2 N = 676, R = 0.592	+Point sizing of Bobbin I-Codes	
	+Point Row 1-3 U-bends	P/D/S	+Point / 10411.1 R0	CM	Depth =1.16*NDE -10.4 Sy,x = 19.02 N=17, R=0.69	+Point Row 1-3 U-bends.	+Point sizing of any low row indications.
	Freespan Ding ≤ 5Vpp	E/D	Bobbin/ 24013.1 R2			100% Bobbin except Row 1-3 U-bends.	+Point all Bobbin I-Codes
		C/S	+Point / 22401.1 R4	CM	Depth = 0.13*NDE + 74.55 Sy,x = 14.44 N = 22, R = 0.13	+Point confirmation of Bobbin I-Codes at Dinged Freespan locations. +Point length sizing	
	Freespan Ding >5Vpp Dented > 2Vpp Eggcrates DB/VS	E/D/S	+Point / 22401.1 R4	CM	Length = 0.74*NDE + 0.27 Sy,x = 0.27 N = 22, R = 0.62	+Point to Detect and Length Size Axial ODSCC at dinged and dented locations.	
	Sludge Pile and Exp Transition	E/D	+Point / I28424 R3	None	POD: Log-Logistic Slope = 11.4155 Intercept = -17.7154	+Point 100% H/L TTS +3 to-12.5 below the bottom of the exp transition	Quantity of H/L indications may force 20% C/L TTS +3 to-12.5 below the bottom of the exp transition

		E/S	+Point / I28431 R2	CM	BED = 0.9941*NDE + 2.7324 Sy,x = 10.685 N = 589, R = 0.895 BEL = 0.6451*NDE + 0.0785 Sy,x = 0.106 N = 589, R = 0.723	+Point to Depth and Length Size Confirmed Axial ODSCC indications at the sludge pile and expansion transitions.	

Damage Mech.	Location	E/P D/C/S	Probe/ ETSS	CMOA	Regression/ POD	Scope	Expansion/ Comments
Axial PWSCC	Row 1-3 U-bends	E/D/S	+Point / (MR) 96511.2 R16	CM	Depth = 0.56*NDE + 19.06 Sy,x = 14.97 N = 24, R= 0.66	+Point Row 1-3 U-bends	If SCC is detected in Row 3, then inspect all U-bends in Row 4 of the affected SG and 20% of Row 4 in the unaffected SG.
		E/D/S	+Point / (HF) 99997.2 R10	CM	Depth = 0.95*NDE – 5.61 Sy,x = 10.50 N = 24, R= 0.85		
	Dented Eggcrates DB/VS Dinged Freespan	P/D/S	+Point / 96703.1 R17	CM	Depth = 0.90*NDE + 7.56 Sy,x = 15.28 N = 46, R= 0.81 Len =1.00*NDE + 0.13 Sy,x = 0.28 N = 46, R= 0.91	+Point All >2Vpp Dents/ Dings. (this scope will be satisfied per the requirements of the Axial ODSSS scope.)	If Axial PWSCC is detected, then a sufficient sample of dents ≤2Vpp (typically 20%) will also be examined using the +Point probe.
	TTS And Exp Transition	E/D/S	+Point / 20511.1 R8	CM	Depth = 0.68*NDE + 14.45 Sy,x = 12.44 N = 33, R= 0.64 PDA = 0.21*NDE + 28.77 Sy,x = 7.95 N = 32, R= 0.33 Len =1.10*NDE - 0.01 Sy,x = 0.13 N = 32, R= 0.87	+Point 100% H/L TTS +3" to 12.5" below the bottom of the expansion transition	Quantity of H/L indications may force 20% random sample on the C/L TTS +3" to 12.5" below the bottom of the expansion transition

Damage Mech.	Location	E/P D/C/ S	Probe/ ETSS	CMOA	Regression/ POD	Scope	Expansion/ Comments
Circ ODSCC	Row 1-3 U-bends	P/D/ S	+Point / 22842.1 R4	CM	Depth = 100%TW Len = 0.52*NDE + 0.03 Sy,x = 0.26 N = 18, R= 0.75	+Point Row 1-3 U-bends	If SCC is detected in Row 3, then inspect all U-bends in Row 4 of the affected SG.
	Dented Eggcrates DB/VS Dinged Freespan	P/D/ S	+Point / 22842.1 R4	CM	Depth = 100%TW Len = 0.52*NDE + 0.03 Sy,x = 0.26 N = 18, R= 0.75	+Point All >2Vpp Dents/ Dings. (this scope will be satisfied per the requirements of the Axial ODSSS scope.)	If an indication is detected, then an expansion will be required based on the dent voltage and significance of the circumferential indication.
	TTS and Exp Transition	E/D/ S	+Point / 21410.1 R6	CM	Depth = 0.13*NDE + 60.10 Sy,x = 24.50 N = 40, R= 0.14 PDA = 1.02*NDE + 21.84 Sy,x = 23.58 N = 38, R= 0.47 Len =1.24*NDE + 0.42 Sy,x = 0.69 N = 38, R= 0.69	+Point 100% H/L TTS +3" to 12.5" below the bottom of the expansion transition	Quantity of H/L indications may force 20% random sample on the C/L TTS +3" to 12.5" below the bottom of the expansion transition

June 21, 2012

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

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Sincerely,

/RA/

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

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