

September 22, 2006

Mr. Paul A. Harden  
Site Vice President  
Nuclear Management Company, LLC  
Palisades Nuclear Plant  
27780 Blue Star Memorial Highway  
Covert, MI 49043-9530

SUBJECT: PALISADES PLANT - SUMMARY OF CONFERENCE CALLS REGARDING  
THE 2006 STEAM GENERATOR TUBE INSPECTIONS (TAC NO. MD1223)

Dear Mr. Harden:

On March 14, April 17, and April 18, 2006, the Nuclear Regulatory Commission (NRC) staff participated in conference calls with Palisades representatives regarding their 2006 steam generator tube inspection activities.

In support of the call on March 14, 2006, the licensee provided the proposed Palisades steam inspection scope for the 2006 refueling outage. The licensee provided additional information concerning the scope of its exams in the tubesheet region by letter dated March 20, 2006. In support of the April 17, 2006, follow-up conference call, the licensee provided information about the scope of the eddy current inspections performed, the status of the proposed inspections, and the number and type of indications identified.

Another call was conducted on April 18, 2006, with Palisades staff to discuss its decision to in-situ pressure-test a tube in SG-A. In support of this call, the licensee provided a description of the indication in question. Subsequently, the licensee informed NRC staff that the tube that was in-situ pressure-tested passed the test with no leakage. Based on the information provided, the staff did not identify any technical issues that warranted follow-up action at the time. Please contact me at (301) 415-1423 if you have questions.

Sincerely,

**/RA/**

L. Mark Padovan, Project Manager  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:  
As stated

cc w/encl: See next page

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ADAMS Accession Number: **ML062560069**

OFFICE	NRR/LPL3-1	NRR/LPL3-1/PM	NRR/LPL3-1/LA	NRR/LPL3-1/BC(A)
NAME	DWright	LPadovan	THarris	MMurphy
DATE	09/21/06	09/24/06	09/19/06	09/22/06

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Palisades Plant

cc:

Robert A. Fenech, Senior Vice President  
Nuclear, Fossil, and Hydro Operations  
Consumers Energy Company  
1945 Parnall Rd.  
Jackson, MI 49201

Arunas T. Udryns, Esquire  
Consumers Energy Company  
1 Energy Plaza  
Jackson, MI 49201

Regional Administrator, Region III  
U.S. Nuclear Regulatory Commission  
Suite 210  
2443 Warrenville Road  
Lisle, IL 60532-4351

Supervisor  
Covert Township  
P. O. Box 35  
Covert, MI 49043

Office of the Governor  
P. O. Box 30013  
Lansing, MI 48909

U.S. Nuclear Regulatory Commission  
Resident Inspector's Office  
Palisades Plant  
27782 Blue Star Memorial Highway  
Covert, MI 49043

Michigan Department of Environmental Quality  
Waste and Hazardous Materials Division  
Hazardous Waste and Radiological  
Protection Section  
Nuclear Facilities Unit  
Constitution Hall, Lower-Level North  
525 West Allegan Street  
P.O. Box 30241  
Lansing, MI 48909-7741

Michigan Department of Attorney General  
Special Litigation Division  
525 West Ottawa St.  
Sixth Floor, G. Mennen Williams Building  
Lansing, MI 48913

Michael B. Sellman  
President and Chief Executive Officer  
Nuclear Management Company, LLC  
700 First Street  
Hudson, MI 54016

Jonathan Rogoff, Esquire  
Vice President, Counsel & Secretary  
Nuclear Management Company, LLC  
700 First Street  
Hudson, WI 54016

Douglas E. Cooper  
Senior Vice President - Group Operations  
Palisades Nuclear Plant  
Nuclear Management Company, LLC  
27780 Blue Star Memorial Highway  
Covert, MI 49043

Stephen T. Wawro, Director  
of Nuclear Assets  
Consumers Energy Company  
Palisades Nuclear Plant  
27780 Blue Star Memorial Highway  
Covert, MI 49043

Laurie A. Lahti, Manager  
Regulatory Affairs  
Nuclear Management Company, LLC  
Palisades Nuclear Plant  
27780 Blue Star Memorial Highway  
Covert, MI 49043

CONFERENCE CALL SUMMARY  
2006 STEAM GENERATOR TUBE INSPECTIONS  
PALISADES  
DOCKET NO. 50-285

On March 14, April 17, and April 18, 2006, the Nuclear Regulatory Commission (NRC) staff participated in conference calls with Palisades representatives regarding their 2006 steam generator (SG) tube inspection activities. A summary of the information provided during the calls is provided below.

Palisades has two Combustion Engineering Model 2530 replacement SGs. There are 8,219 mill annealed Alloy 600 tubes in each SG. The tubes have an outside diameter of 3/4-inch and a wall thickness of 0.042-inch. The tubes are supported at various locations by stainless steel eggcrate lattice type tube supports, diagonal straps and vertical straps. The SG tubes were expanded through the full depth of the tubesheet using an explosive process.

In support of the March 14, 2006, conference call, the licensee provided the following information regarding the planned scope of their 2006 SG tube inspections:

Proposed Palisades Steam Inspection Scope 2006 Refueling Outage

100 percent full length bobbin coil exam (except Row 1 and 2 U-bends)

100 percent +Point™ exam with extent from 3 inches above TTS [top of tubesheet] to 11.6 inches below TTS in both SGs in accordance with WCAP-1608-P [16208-P].

100 percent Rows 1, 2, and 3 small radius U-bend +Pt [+Point™] exam in both SGs using mid-range coil

100 percent +Point™ exam of freespan dings >5V between tubesheet hot (TSH) and tubesheet cold (TSC) in both SGs

100 percent +Point™ exam of dents >5V at structures between TSH and TSC in both SGs

100 percent +Point™ exam of ≤5V dents at eggcrates in both SGs

25 percent +Point™ exam of historic %TW [through wall] calls at diagonal bars and vertical straps in both SGs

Special Interest +Point™ exam including

Confirmation of bobbin I-code signals including all DSI [distorted support indication] signals at eggcrates

+Point™ exam testing of wear scars reported as >40 percent TW by bobbin

ENCLOSURE

- +Point™ exam testing of newly reported signals at structures (vertical straps, diagonal bars, and eggcrates) to confirm degradation mechanism mode

- +Point™ examination through the square bend region of tubes surrounding R99 C140 in SG-B

- +Point™ exam “boxing” of confirmed foreign object wear signals at all elevations

- +Point™ exam of the outer three peripheral tubes at the cold-leg TTS for detection of possible loose parts or wear signals

The licensee provided additional information concerning the scope of their exams in the tubesheet region by letter dated March 20, 2006 (ADAMS Accession No. ML060800610).

In support of the April 17, 2006, conference call, the licensee provided information about the scope of the eddy current inspections performed, the status of the inspections, and the number and type of indications identified. This information is attached to this summary. Additional clarifying information and information not included in the document provided is summarized below:

In SG-A, there were 5 wear indications in which the depth of degradation was greater than 40 percent through wall. The maximum depth of these indications was determined to be 43 percent through wall. The maximum growth of these wear indications from the previous inspection was 6 percent. The growth rates for the wear indications were consistent with those from the previous inspection.

In SG-A, one tube was restricted by a foreign object located within the tube. During initial tests, the restriction was at the fifth hot-leg tube support, however, during a retest, the restriction was near the top of the tubesheet on the hot-leg side of the SG. The foreign object was identified inside the tube (primary side), and was determined to be approximately 5/8 inches long and metallic. The origin of the object is unknown. The tube was inspected both above and below the loose part (with a bobbin from the cold-leg tube end to the first hot-leg tube support and with a rotating probe from the hot-leg tube end to near the top of the tubesheet on the hot-leg side of the SG). No indications were identified in this tube. No damage was observed at the ends of any other tubes (i.e., at the primary face of the tubesheet). The licensee stated that the part was firmly wedged inside the tube and attempts to dislodge it were unsuccessful. Because the part was firmly wedged in place, and because relative vibration between the tube and the object is expected to be minimal based on its proximity to the tubesheet, the foreign object was left in place. The tube was removed from service by plugging.

The longest axial outer diameter stress corrosion cracking (ODSCC) identified in either SG was 0.27 inches. The maximum eddy current voltage of any axial ODSCC in either SG was approximately 0.3 volts.

The maximum extent of any circumferential ODSCC in either SG was 105 degrees. The maximum eddy current voltage of any circumferential ODSCC in either SG was 0.52 volts.

In SG-A, one axial ODSCC indication was identified in a 10.5 volt ding. This indication was 0.2 inches in length with a maximum eddy current voltage of 0.74 volts. The licensee indicated that the voltage amplitude of the flaw may have been skewed by the residual influence of the ding. For this reason, the licensee believes the actual crack would have a voltage amplitude less than 0.74 volts.

The maximum length of any freespan ODSCC in either SG was 0.36 inches. The maximum eddy current voltage of any freespan ODSCC in either SG was approximately 0.2 volts.

The maximum length of any ODSCC at an eggcrate support in either SG was 0.81 inches. The maximum eddy current voltage of any ODSCC at an eggcrate support in either SG was approximately 0.42 volts.

The maximum length of any axial primary water stress corrosion cracking in either SG was 0.31 inches. The maximum eddy current voltage of any axial primary water stress corrosion cracking in either SG was approximately 0.72 volts.

Tube integrity was not challenged by any of the flaws identified.

All dents and dings with voltage amplitude greater than 5 volts were inspected, including dents and dings located at eggcrate supports.

In SG-B, the inspection of the U-bend portion of one row 3 tube resulted in preventive plugging of the tube. An indication measuring approximately 0.1 inches was identified. The licensee attributed the indication to lift off of the probe. Multiple inspections were performed at different speeds with the same result. Because the licensee was not able to rule out a flaw, the tube was plugged. This location had not been inspected with a rotating probe previously. As a result of this finding, the U-bend regions of all row 4 tubes were inspected with a rotating probe. The licensee believes that the cause of the indication was a burr on the inner diameter of the tube created during the manufacturing process. The licensee indicated that a similar indication was observed in a SG tube being manufactured for a replacement SG. Destructive examination of that tube showed the presence of a burr. The flaw that was identified during manufacturing exhibited similar behavior to the one seen at Palisades during this outage.

In SG-A, the licensee believes that the possible loose part (PLP) signal was caused by a conductive deposit since the tube is located in the middle of the tube bundle in a region where sludge is known to accumulate.

In SG-B, a volumetric indication associated with a PLP measured 0.22 inches with an amplitude of 0.29 volts. The PLP was evident on a total of three tubes. Only one of the tubes had a volumetric wear indication. A review of the data from past eddy current inspections shows that the PLP signal was present during the last two inspections and it has exhibited some minor changes since the last inspection. All three tubes affected by the PLP will be plugged and stabilized. The ability to visually inspect the region is limited due to the triangular pitch of the SG tubes; however, a metallic part could be seen at this location.

Based on off-gas measurements the primary to secondary leakage for the past operating cycle was approximately 1E-5 gallons per minute ( 0.014 gallons per day).

No secondary side pressure tests were performed.

No exceptions were taken to the industry guidelines for eddy current inspection of SG tubes.

All crack-like indications will be plugged. All circumferential cracks and all volumetric indications with PLPs will be plugged and stabilized.

At the time of this call no in-situ pressure tests or tube pulls were planned.

On April 18, 2006, another call was conducted with Palisades staff to discuss their decision to in-situ pressure test a tube in SG-A. In support of this call, the licensee provided a description of the indication in question. A summary of this information is provided below:

Bobbin testing identified a direction-setting issue (DSI) at the first eggcrate support on the hot-leg side. The bobbin voltage amplitude on the mixed channel was 0.15 volts.

+Point™ inspection of the DSI indication identified a single axial indication. The indication was determined to be 0.81 inches long with a voltage amplitude of 0.42 volts.

The flaw profile for this indication is atypical since it has a relatively uniform depth for the entire length of the flaw (most crack like indications at this location have shallow depths at the end of the cracks with a short length corresponding to the deepest part of the crack).

The rotating probe signal exhibited somewhat of a ding like response; however, no ding was present in the bobbin data.

A Monte Carlo simulation was performed including burst relation error and material property distribution for Palisades. Based on the as reported amplitude based depth estimates, the predicted burst pressure at 95 percent probability for the flaw was 4600 pounds per square inch (psi). When depth sizing uncertainties were accounted for the simulation resulted in a burst pressure of 3400 psi at 95% probability.

Based on the results of the +Point™ inspection, the licensee decided to perform in-situ pressure testing of the indication.

Subsequent to the call on April 18, 2006, the licensee informed NRC staff that the tube that was in-situ pressure tested passed the test with no leakage. Based on the information provided, the staff did not identify any technical issues that warranted follow-up action at this time.



PALISADES NUCLEAR PLANT STEAM GENERATOR STATUS REPORT  
Steam Generator E-50A

April 17, 2006

Scope Description	Eddy Current Analyzed And Complete	Potential Indications Requiring Tube Plugging
100% bobbin full length scope	99.9% complete	5 wear indications > 40% 1 axial ODSCC at eggcrates 2 axial ODSCC freespan 1 restricted at hot leg top of tubesheet
100% +Point <sup>TM</sup> top of tubesheet hot-leg +3/-13.5 inches	100% complete	4 axial ODSCC in sludge pile 5 circumferential ODSCC hot-leg transition zone 2 axial PWSCC in hot-leg transition zone & tubesheet 1 volumetric with PLP
8% +Point <sup>TM</sup> top of tubesheet cold-leg +2/-2 inches	100% complete	None
100% +Point <sup>TM</sup> rows 1-3 u-bend	100% complete	None
100% +Point <sup>TM</sup> freespan & square bend dings > 5 volts	99.9% complete	1 axial ODSCC in 10.5 volt ding
100% +Point <sup>TM</sup> of >2V and <5V dents at eggcrates	99.9% complete	None
25% +Point <sup>TM</sup> of historic %TW calls at diagonal bars and vertical straps	99.9% complete	None

Attachment



100% +Point <sup>TM</sup> of newly reported signals at structures	100% complete	None
100% visual inspection of all tube plug hot and cold legs	In progress Just finished tubes under ROSA base plate	None
Upper bundle flush, sludge lancing & FOSAR	Scheduled after SG E-50B which is in progress	No data

In Steam Generator E-50A eddy current data acquisition is 99.9% complete and analysis is 99.9% complete. A total of 22 tubes require potential tube plugging.

PALISADES NUCLEAR PLANT STEAM GENERATOR STATUS REPORT  
Steam Generator E-50B

April 17, 2006

Scope Description	Eddy Current Analyzed And Complete	Potential Indications Requiring Tube Plugging
100% bobbin full length scope	100% complete	1 wear indications > 40%
100% +Point <sup>TM</sup> top of tubesheet hot leg +3/-13.5 inches	100% complete	3 axial ODSCC in sludge pile 1 volumetric with PLP
8% +Point <sup>TM</sup> top of tubesheet cold-leg +2/-2 inches	100% complete	None
100% +Point <sup>TM</sup> rows 1-4 u-bend	100% complete	1 preventative
100% +Point <sup>TM</sup> freespan & square bend dings > 5 volts	100% complete	None
100% +Point <sup>TM</sup> of >2V and <5V dents at eggcrates	99.9% complete	None
25% +Point <sup>TM</sup> of historic %TW calls at diagonal bars and vertical straps	99.9% complete	None
100% +Point <sup>TM</sup> of newly reported signals at structures	100% complete	None
100% visual inspection of all tube plug hot and cold legs	In progress Just finished tubes under ROSA base plate	None
Upper bundle flush, sludge lancing & FOSAR	In progress Moving sludge lance equipment to SG E-50A	FOSAR in progress No data on sludge weight

In Steam Generator E-50B eddy current data acquisition is 99.9% complete and analysis is at 99.9% complete. A total of 6 tubes require potential tube plugging.