NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Point Beach Nuclear Plant, Unit 2	0 5 0 0 0 3 0 1	1 OF 0 7

TITLE (4)
Degradation of Steam Generator Tubes

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
1 0	2 1	8 6	8 6	0 0 7	0 0	1 1	2 6	8 6	N/A	0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10) 1 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
C. W. Fay, Vice President-Nuclear Power	4 1 1 4 2 7 7 - 2 8 1 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B	A B	I S I G	W 1 1 2 0	Yes							

SUPPLEMENTAL REPORT EXPECTED (14)

		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

Unit 2 was shut down for refueling 12 on September 26, 1986. Eddy current examination of the steam generator tubes was conducted from October 9 to October 22, 1986, using a digital multi-frequency eddy current system. Eddy current inspection of the "A" steam generator showed eight tubes degraded equal to or greater than 40% and six with an undefined signal. All 14 were plugged. Eddy current of the "B" steam generator showed 58 tubes degraded equal to or greater than 40%. All 58 tubes were plugged.

During an 800 psid leak test, no tubes were found to be leaking.

This event is similar to others of this type.

IE22 1/1

800 PSID LEAK CHECK

Prior to the eddy current inspection, 800 psid secondary to primary leak checks were performed in the hot and cold legs of each steam generator on October 8-9, 1986. The leak checks were performed visually with the aid of remote video equipment. No detectable leakage was noted during these inspections.

EDDY CURRENT INSPECTION SCOPE

Eddy current inspections began shortly after the leak testing was completed. The eddy current program which was used addressed the following items:

1. The 3 percent full-length sample required by Technical Specifications.

2. Previously degraded tubes that have not been repaired.

3. A sample of the tubes which had sleeves installed in the hot legs in 1983.

4. One hundred percent of the remaining unsleeved tubes in the hot leg to the first support plate.

5. Possible tubesheet crevice corrosion in unsleeved tubes.

6. One hundred percent inspection of the cold leg to the first support plate for wastage and pitting.

The number of tubes inspected and the extent of the inspections are as follows:

"A" Steam Generator

Extent of Inspection	Number of Tubes From Hot Leg	Number of Tubes From Cold Leg
Full length		96
Through U-Bend	4	16
#1TSP	1540	2943
#2TSP	9	31
#3TSP	2	
#5TSP	2	
#6TSP		1
Sleeves	61	
To Top of Sleeve		52
TOTAL	1618	3139

"B" Steam Generator

Extent of Inspection	Number of Tubes From Hot Leg	Number of Tubes From Cold Leg
Full length	80 (Sleeves)	
Through U-Bend	23	
#1TSP	1566	3040
#2TSP	37	12
#3TSP		3
#4TSP		1
#5TSP & #6TSP		3
Sleeves	59	
To Top of Sleeve		67
TOTAL	1765	3126

Inspections from the cold leg side were performed due to concerns with cold leg wastage found during the U2R11 outage. Inspections from the cold leg side of hot leg sleeved tubes provide greater sensitivity than inspections from the hot leg over the U-bend to the cold leg which requires a smaller probe diameter. This is because the inside diameter of the sleeve is smaller than the tube.

PLUGGED TUBES "A" STEAM GENERATOR

On October 19, 1986, review and verification of all eddy current data for tubes with indications exceeding the plugging limit was completed. Eight tubes in the unsleeved region of the "A" steam generator were verified to have degradation equal to or greater than 40% (Technical Specifications limit 15.4.2.A.5). In addition, six tubes contained undefined indications (UDI) and were plugged. All fourteen tubes were plugged on October 20, 1986. The following is a list of these plugged tubes:

Tube	Defect	Location	Cause
R1C3	UDI	3.2" ATE HL	Crevice Corrosion
R16C7	UDI	5.5" ATE HL	Crevice Corrosion
R4C17	93%	11.9" ATE HL	Crevice Corrosion
R32C33	74%	7.3" ATE HL	Crevice Corrosion
R36C36	94%	4.0" ATE HL	Crevice Corrosion
R42C38	61%	7.3" ATE HL	Crevice Corrosion
R37C39	89%	3.9" ATE HL	Crevice Corrosion
R43C40	UDI	10.1" ATE HL	Crevice Corrosion

Tube	Defect	Location	Cause
R44C40	78%	5.8" ATE HL	Crevice Corrosion
R40C44	74%	6.7" ATE HL	Crevice Corrosion
R41C56	UDI	3.0" ATE HL	Crevice Corrosion
R4C73	89%	11.4" ATE HL	Crevice Corrosion
R4C79	UDI	6.2" ATE HL	Crevice Corrosion
R13C84	UDI	6.2" ATE HL	Crevice Corrosion

ATE - Above Tube End
HL - Hot Leg
UDI - Undefined Indication

The tubes listed appear to bear witness to the expected crevice corrosion problems identified in recent examinations.

PLUGGED TUBES "B" STEAM GENERATOR

In the "B" steam generator, 58 tubes were reviewed and verified as having degradation greater than 40%. Of these tubes, 54 were noted in the cold leg examination and 4 in the hot leg examination. The following is a list of the tubes which were mechanically plugged in the "B" steam generator on October 21 and 22, 1986:

Tube	Defect	Location	Cause
R10C27	46%	1.3" ATS CL	Wastage
R13C27	47%	0.4" ATS CL	Wastage
R12C29	43%	1.4" ATS CL	Wastage
R18C29	43%	0.3" ATS CL	Wastage
R18C32	42%	1.0" ATS CL	Wastage
R7C43	44%	0.6" ATS CL	Wastage
R14C43	53%	0.4" ATS CL	Wastage
R7C44	43%	0.8" ATS CL	Wastage
R19C44	43%	1.0" ATS CL	Wastage
R5C45	45%	0.6" ATS CL	Wastage
R6C45	54%	0.9" ATS CL	Wastage
R8C45	52%	1.1" ATS CL	Wastage
R11C45	43%	1.2" ATS CL	Wastage
R1C46	72%	0.9" ATS HL	Wastage
R5C46	45%	0.4" ATS CL	Wastage
R12C46	47%	0.9" ATS CL	Wastage
R14C46	46%	0.5" ATS CL	Wastage
R5C47	75%	1.5" ATS CL	Wastage
R10C47	44%	1.2" ATS CL	Wastage

Tube	Defect	Location	Cause
R15C47	48%	0.8" ATS CL	Wastage
R16C47	41%	2.0" ATS CL	Wastage
R5C48	42%	0.6" ATS CL	Wastage
R6C48	43%	0.6" ATS CL	Wastage
R21C48	46%	0.9" ATS CL	Wastage
R18C49	44%	0.7" ATS CL	Wastage
R20C49	40%	0.8" ATS CL	Wastage
R22C49	48%	0.4" ATS CL	Wastage
R18C50	41%	1.1" ATS CL	Wastage
R19C50	51%	0.7" ATS CL	Wastage
R18C51	43%	0.7" ATS CL	Wastage
R20C51	46%	0.7" ATS CL	Wastage
R21C51	40%	0.6" ATS CL	Wastage
R23C51	44%	0.8" ATS CL	Wastage
R21C52	45%	0.8" ATS CL	Wastage
R23C52	43%	0.9" ATS CL	Wastage
R24C52	44%	0.6" ATS CL	Wastage
R15C53	45%	0.8" ATS CL	Wastage
R16C53	40%	0.9" ATS CL	Wastage
R22C53	48%	0.7" ATS CL	Wastage
R24C53	44%	0.4" ATS CL	Wastage
R25C54	48%	0.3" ATS CL	Wastage
R24C55	44%	1.1" ATS CL	Wastage
R23C57	42%	0.7" ATS CL	Wastage
R7C58	46%	0.5" ATS CL	Wastage
R6C59	45%	0.7" ATS CL	Wastage
R7C59	62%	0.5" ATS CL	Wastage
R24C59	46%	1.0" ATS CL	Wastage
R4C60	44%	0.3" ATS CL	Wastage
R7C62	48%	0.3" ATS CL	Wastage
R22C64	46%	0.7" ATS CL	Wastage
R22C67	42%	0.3" ATS CL	Wastage
R11C68	47%	0.5" ATS CL	Wastage
R7C69	42%	0.8" ATS CL	Wastage
R18C69	54%	0.3" ATS CL	Wastage
R18C70	54%	0.2" ATS CL	Wastage
R23C78	UDI	7.3" ATE HL	Crevice Corrosion
R23C80	UDI	3.7" ATE HL	Crevice Corrosion
R23C82	87%	3.2" ATE HL	Crevice Corrision

ATS - Above Tubesheet
HL - Hot Leg
UDI - Undefined Indication
CL - Cold Leg
ATE - Above Tube End

The 1986 data from both steam generators was compared to the 1985 data to determine tube degradation rates (indication growth rate). The results are as follows:

1. In terms of tube wall thickness degradation percentages and affected steam generator area, the degree of cold leg wastage at the top of the tubesheet in the "A" steam generator is much less than in the "B" steam generator.

2. In the "A" steam generator cold leg, the growth rate of previous indications is very slow as only one previous indication showed any growth (4%).

3. In the "B" steam generator hot leg, all previous indications showed growth rates under 10% from 1985 indications.

4. In the "B" steam generator cold leg, 49 tubes with previous reportable indications required plugging. Five additional pluggable indications were also found.

5. The growth rate associated with the "B" cold leg appears to be in the 4-20 percent/year range. This may be somewhat misleading as the technique used to quantify the indications during this inspection changed in a conservative manner. Indications were on the average about 15% larger in volume than similar indications reported in the 1985 inspection. To eliminate signal distortions present because of copper deposits, a mix signal channel was used in 1986 rather than the absolute signal channel used in 1985. This change caused the conservative quantification of indications.

6. In summary, the problems in and directly above the tubesheet continue to be of the most concern. Growth rates continue to stay in the 4-20 percent/year category. Several indications which exceeded the plugging limits have appeared randomly.

Cold Leg Wastage and Pitting

Both steam generator cold legs showed signs of being affected by wastage. The "B" steam generator has been affected more. In the "B" steam generators, 670 tubes were identified as having this type of problem, while in the "A" steam generator only 51 tubes showed minor indications of this type. Once again, pitting, which has been found at other plants, has not been found at Point Beach.

Tubesheet Crevice Corrosion

Fifteen tubes were found in the "A" steam generator with signs of crevice corrosion. Fourteen of these tubes required plugging. Eight tubes were found in the "B" steam generator with signs of crevice corrosion. Three of these tubes required plugging.

Sleeved Tubes

A total of 120 sleeves were inspected (61 in "A," 59 in "B") with no reportable indications in either steam generator. Fifty sleeved tubes in the "B" steam generator were plugged, however, due to cold leg tube indications.

Probe Restrictions

Probe restrictions were noted in both steam generators in the unsleeved regions. In the "A" steam generator, 48 tubes would not pass a 0.720" probe, 19 tubes would not pass a 0.700" probe, and 5 tubes would not pass a 0.680" probe. These 5 did pass a 0.640" probe so they did not have to be plugged. In the "B" steam generator, 6 tubes would not pass a 0.720" probe, and 3 tubes would not pass a 0.700" probe. These 3 did pass a 0.680" probe. This appears to be as a result of denting at the first tube support plate in both generators.

Sludge Lancing

Sludge lancing was performed this outage. The total weight of sludge removed was 334 lbs. from the "A" steam generator and 483 lbs. from the "B" steam generator. An additional 51 lbs. was removed from cuno filters used as a "polishing" type filter for the demineralized water return. Routine checks with fiber optics were made to assess the cleanliness after lancing, and the results were satisfactory.

Minimization of Tube Degradation

Other measures have been undertaken to minimize degradation of the steam generator tubes. These include crevice flushing prior to heating up to normal operating temperature and maintaining stricter chemistry controls in accordance with the prescribed guidelines. Additionally, the majority of the secondary side heat exchanger tubing made of copper containing alloys has been replaced by stainless steel tubing.

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VPNPD-86-489
NRC-86-113

November 26, 1986

Mr. J. G. Keppler, Regional Administrator
Office of Inspection and Enforcement
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET 50-301
LICENSEE EVENT REPORT 86-007-00
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT, UNIT 2

Enclosed is Licensee Event Report 86-007-00 for Point Beach Nuclear Plant, Unit 2. This report is being provided in accordance with Technical Specification 15.4.2.A.7(a), "After each inservice examination, the number of tubes plugged or repaired in each steam generator shall be reported to the Commission as soon as practicable," and 15.4.2.A.7(c), "Reports required by Table 15.4.2-1, 'Steam Generator Tube Inspection', shall provide the information required by Technical Specification 15.4.2.A.7(b) and a description of investigations conducted to determine the cause of the tube degradation and corrective measures taken to prevent recurrence." LER 86-007-00 is filed according to the above table under the reporting requirement of 10CFR50.73(a)(2)(ii).

If any further information is required, please contact us.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Enclosure

Copies to NRC Resident Inspector
NRC Document Control Desk
Washington, D. C. (with original)

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