NMC
Committed to Nuclear Excellence

Nuclear Management Company, LLC
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East • Welch MN 55089

March 19, 2002

Technical Specification 4.12.E

U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 50-306 License No. DPR-60

2002 Unit 2 Steam Generator Category C-3 Inspection Results 30 Day Report

In accordance with Technical Specification 4.12.E.3, this special report due to Category C-3 inspection results of the Unit 2 steam generator tubing is provided for the information of the NRC Staff:

Following the recent inservice inspection of the Unit 2 steam generators, 35 tubes were plugged for the first time. The percentage of tubes plugged is 6.58% in 21 steam generator and 7.08% in 22 steam generator. Details of the inspections and repairs are provided in Attachment 1.

The results of the inspection of 21 Steam Generator and 22 Steam Generator were classified as Category C-3 in accordance with Technical Specification 4.12 because more than 1% of the inspected tubes in each Steam Generator were defective. The NRC Staff was informed of the Category C-3 classification by telephone on February 12, 2002. In accordance with Technical Specification 4.12.E.3, the 30 day special report on the Category C-3 steam generator inspection results is provided as Attachment 2 to this letter.

Attachment 3 lists the tubes pressure tested in situ to support the condition monitoring assessment.

Steam generator tubing examination and repairs were conducted from February 5, 2002 through February 18, 2002.

A047

In this letter, we make the following commitment:

Further information regarding steam generator tube flaw detection and criteria used at Prairie Island to differentiate between flaw signals and noise will be provided in the 90-day AMSE Code Section XI ISI Summary report.

Please contact Richard Pearson (651-388-1121) if you have any questions related to this letter.

M.K. Nazar

Mano K. Nazar
Site Vice President
Prairie Island Nuclear Generating Plant

cc: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC

Attachments:
1. Steam Generator Plugged Tube and F* / EF* Tube Summary
2. Prairie Island Unit 2 Steam Generator Category C-3 Tube Inspection Special Report
3. Prairie Island Unit 2 February 2002 In Situ Pressure Tests

ATTACHMENT 1

STEAM GENERATOR PLUGGED TUBE AND F*/EF* TUBE SUMMARY

21 and 22 Steam Generator Inspection Scope Summary

Inspection Scope

All open tubes were examined full length with the bobbin coil, except for Row 1 and 2 U-bends.

- All Row 1 and 2 U-bends were examined with the Standard Mid Range Frequency +Point™ Coil (PP11A).
- All Row 1 and 2 U-bends which exceeded noise criteria, equal to the average of the EPRI Mid Range Frequency U-bend examination qualification data set, were examined with the High Frequency +Point™ Coil (PP9A).
- All Row 1 and 2 U-bends which exceeded noise criteria, equal to the average of the EPRI High Frequency U-bend examination qualification data set, were re-evaluated with the Mid Range Frequency +Point™ Coil (PP11A) utilizing a band pass filter.
- All hot leg tubes (including tubes previously re-rolled) were examined with rotating probe technology (including the +Point™ coil) from tube end hot to 3 inches above the top of the tubesheet.
- All non-quantifiable bobbin coil indications, including all distorted tube support plate indications, were examined with rotating probe technology (including the +Point™ coil).

No expansions were required.

A visual examination was performed on 100% of the tube plugs.

An eddy current examination was performed on 25% of the ABB Alloy 690 hot leg tube plugs with rotating coil technology.

An eddy current examination was performed on the tubes following in situ pressure testing.

All tubes repaired using the re-roll process were examined with rotating probe technology (including the +Point™ coil and a bobbin coil) following the repair.

No tube pulls were performed during this inspection.

21 Steam Generator Plugged Tube and F*/EF* Tube Summary

As a result of the visual and eddy current inspections, 11.4% (363 of 3177) of the inspected tubes in 21 Steam Generator contained defects requiring repair by plugging, additional roll expansions or application of the F-Star (F*) alternate repair criteria for indications near the tube end. A complete list of tubes left in service using the F* and Elevated F-Star (EF*) alternate repair criteria were provided in the previously submitted 15 day report. A summary of F* and EF* tubes is provided in Table 1. Twelve (12) of the defective tubes were plugged, forty three (43) were left in service without an additional re-roll using the F* alternate repair criteria and the remaining three hundred eight (308) tubes were left in service using new Additional Roll Expansions and either the F-Star (F*) or Elevated F-Star (EF*) alternate repair criteria.

Summary

New Tubes Plugged this Outage:	12
Total Plugged Tubes:	223
Total F* Tubes in Service:	1161
Total EF* Tubes in Service:	6
21 Steam Generator Percent Plugged:	6.58%

Indications of Defective Tubes

Three hundred sixty three (363) defective tubes were identified with the following types of degradation:

1. Wastage

   One (1) tube was plugged for thinning at the cold leg tube support plate.

2. Secondary Side IGA/SCC in Hot Leg Tubesheet Region

   Seven (7) tubes contained single or multiple indications in the tubesheet crevice region indicative of secondary side IGA/SCC occurring in the tubesheet region. Two (2) tubes were in situ pressure tested and subsequently plugged. One (1) tube was plugged. Four (4) tubes were successfully repaired with a re-roll at the second elevation and the F* criteria.

3. Secondary Side IGA/SCC at Tube Support Plates

   There were no confirmed indications of secondary side IGA/SCC at tube support plates.

4. Primary Water Stress Corrosion Cracking (PWSCC) at the Hot Leg Roll Transition Zone

   Three hundred seven (307) tubes contained single or multiple inside diameter axial indications at the Roll Transition Zone. One (1) was plugged due to re-roll equipment restrictions. Two (2) were plugged due to unsatisfactory elevated re-roll profiles. Two hundred ninety eight (298) tubes were repaired using re-rolls and the F* criterion. Six (6) tubes were repaired using elevated re-rolls and the EF* criterion.

5. Primary Water Stress Corrosion Cracking (PWSCC) at the Rows 1 and 2 U-bends

   There were no indications of tube degradation or excessive noise in the rows 1 and 2 U-bends.

6. Possible PWSCC Near the Tube End

   Forty three (43) tubes contained short axial indications near the hot leg tube end. These tubes were all classified as F*0 tubes (tubes with tube end cracks that meet F* requirements without additional re-rolls).

7. Other

   Four (4) tubes contained permeability indications in both the magnetically biased bobbin coil and magnetically biased +Point™ coil of such magnitude and duration that a critical flaw could go undetected. The four (4) tubes were plugged.

   One (1) tube contained a single outside diameter volumetric indication above the top of the tubesheet. The one (1) tube was plugged.

8. Previous F*/EF* Indications

   Eighty nine (89) of the previous one hundred eleven (111) F*0 tubes remain in service. Twenty two (22) tubes were repaired with a re-roll at the first elevation.

   Six hundred ninety seven (697) of the previous seven hundred seventeen (717) F*1 tubes remain in service. Twenty (20) tubes required new repairs. Seventeen (17) tubes were repaired with a re-roll at the second elevation. Three (3) tubes were plugged.

   Thirty (30) of the previous thirty four (34) F*2 tubes remain in service. Four (4) tubes required new repairs. Three (3) tubes were repaired with an elevated re-roll. One (1) tube was plugged.

   Zero (0) previous EF* tubes existed.

Visual Tube Plug Inspection

A visual inspection was done of all installed tube plugs. No unusual conditions were found.

Visual Tube Leak Inspection

A visual inspection for leakage was conducted following the re-roll repairs with the secondary side pressurized to greater than 100 psig. There were no signs of leakage.

Circumferential Indications

One (1) tube contained a circumferential indication in the lower region of the hard roll. This tube met the F* requirements without re-rolling in the current and previous inspection.

Table 1

Prairie Island Unit 2 RFO21 SG 21 F*/EF* Summary

	EOC 20	2002 Repairs		BOC 21
		Losses	New	
F*0	111	-22	43	132
F*1	717	-20	279	976
F*2	34	-4	23	53
EF*	0	0	6	6
Total F*/EF*	862	-46	351	1167
% F*/EF* Per SG	25.4%			34.4%

Losses are tubes re-rolled at a higher elevation or plugged.
The Total F*/EF* New (351) minus the F*0 New (43) plus the plugs (12) = the total repairs performed (320).

22 Steam Generator Plugged Tube and F*/EF* Tube Summary

As a result of the visual and eddy current inspections, 7.1% (226 of 3171) of the inspected tubes in 22 Steam Generator contained defects requiring repair by plugging, additional roll expansions or application of the F-Star (F*) alternate repair criteria for indications near the tube end. A complete list of tubes left in service using the F* alternate repair criteria were provided in the previously submitted 15 day report. A summary of F* tubes is provided in Table 2. Twenty three (23) of the defective tubes were plugged, thirty six (36) were left in service without an additional re-roll using the F* alternate repair criteria and the remaining one hundred sixty seven (167) tubes were left in service using new Additional Roll Expansions and the F* alternate repair criteria.

Summary

New Tubes Plugged this Outage:	23
Total Plugged Tubes:	240
Total F* Tubes in Service:	697
Total EF* Tubes in Service:	0
22 Steam Generator Percent Plugged:	7.08%

Indications of Defective Tubes

Two hundred twenty six (226) defective tubes were identified with the following types of degradation:

1. Wastage

   One (1) tube was plugged for thinning at the cold leg tube support plate.

2. Wear

   One (1) tube was plugged for wear at the new anti-vibration bar.

3. Secondary Side IGA/SCC in Hot Leg Tubesheet Region

   Five (5) tubes contained single or multiple indications in the tubesheet crevice region indicative of secondary side IGA/SCC occurring in the tubesheet region. Two (2) tubes were in situ pressure tested and subsequently plugged. Two (2) tubes were plugged. One (1) tube was successfully repaired with a re-roll at the second elevation and the F* criteria.

4. Secondary Side IGA/SCC at Tube Support Plates

   There were no confirmed indications of secondary side IGA/SCC at tube support plates.

5. Primary Water Stress Corrosion Cracking (PWSCC) at the Hot Leg Roll Transition Zone

   One hundred sixty eight (168) tubes contained single or multiple inside diameter axial indications at the Roll Transition Zone. One (1) was in situ pressure tested and plugged. One (1) was plugged due to an unsatisfactory re-roll profile. One hundred sixty six (166) tubes were repaired using re-rolls and the F* criterion.

6. Primary Water Stress Corrosion Cracking (PWSCC) at the Rows 1 and 2 U-bends

   There were no indications of tube degradation in the U-bends. Seven (7) tubes were plugged due to excessive noise in the row 1 U-bends.

7. Possible PWSCC Near the Tube End

   Thirty six (36) tubes contained short axial indications near the hot leg tube end. These tubes were all classified as F*0 tubes (tubes with tube end cracks that meet F* requirements without additional re-rolls).

8. Other

   Six (6) tubes contained permeability indications in both the magnetically biased bobbin coil and magnetically biased +Point™ coil of such magnitude and duration that a critical flaw could go undetected. The six (6) tubes were plugged.

   One (1) tube contained a single outside diameter volumetric indication below the top of the tubesheet. The one (1) tube was plugged.

   One (1) tube contained a single outside diameter axial indication above the top of the tubesheet. The one (1) tube was in situ pressure tested and plugged.

9. Previous F*/EF* Indications

   Seventy two (72) of the previous eighty five (85) F*0 tubes remain in service. Thirteen (13) tubes required new repairs. Eight (8) tubes were repaired with a re-roll at the first elevation. Five (5) tubes were plugged.

Three hundred ninety one (391) of the previous three hundred ninety eight (398) F*1 tubes remain in service. Seven (7) tubes required new repairs. Four (4) tubes were repaired with a re-roll at the second elevation. Three (3) tubes were plugged.

Thirty one (31) of the previous thirty one (31) F*2 tubes remain in service.

Zero (0) previous EF* tubes exist.

Visual Tube Plug Inspection

A visual inspection was done of all installed tube plugs. Two (2) Westinghouse Inconel 600 explosive plugs installed in January 1980 exhibited signs of leakage. One (1) plug was dripping upon installation of the bowl camera. One (1) plug had a visible boron ring near the end of the inspection. Both plugs were replaced with Westinghouse Inconel 690 welded tubesheet plugs. No other unusual conditions were found.

Visual Tube Leak Inspection

A visual inspection for leakage was conducted following the re-roll repairs and welded tubesheet plug repairs with the secondary side pressurized to greater than 100 psig. There were no signs of leakage.

Circumferential Indications

One (1) tube contained a circumferential indication in the lower region of the hard roll. This tube met the F* requirements without re-rolling.

Table 2

Prairie Island Unit 2 RFO21 SG 22 F*/EF* Summary

	EOC 20	2002 Repairs Losses	2002 Repairs New	BOC 21
F*0	85	-13	36	108
F*1	398	-7	155	546
F*2	31	0	12	43
EF*	0	0	0	0
Total F*/EF*	514	-20	203	697
% F*/EF* Per SG	15.2%			20.6%

Losses are tubes re-rolled at a higher elevation or plugged.
The Total F*/EF* New (203) minus the F*0 New (36) plus the plugs (23) = the total repairs performed (190).

ATTACHMENT 2

PRAIRIE ISLAND UNIT 2 STEAM GENERATOR CATEGORY C-3 TUBE INSPECTION SPECIAL REPORT

Purpose

This report fulfills the special reporting requirements of Prairie Island Technical Specification 4.12.E.3. This report is required whenever the steam generator tube inservice inspection finds more than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective. This report summarizes the inspection results, the causes of tube degradation, the condition monitoring assessment, and the operational assessment. Corrective measures to prevent recurrence of Category C-3 inspections are discussed. It is acknowledged that steam generator inspection results continue to exceed the category C-3 limits and that remedial actions do not prevent recurrence. However, careful inspections and repairs coupled with chemistry controls and low operating temperature provide assurance of safe and reliable steam generator operation.

Summary

An inservice inspection consisting of inspection of 100% of the full length of tubing with the bobbin coil and 100% of the hot leg tubesheet region and the row 1 and 2 u-bends with mechanical rotating probes with +Point™ coil was conducted in Unit 2 Steam Generators from February 5, 2002 through February 18, 2002.

As a result of the visual and eddy current inspections, 11.4% (363 of 3177) of the inspected tubes in 21 Steam Generator contained defects requiring repair. Twelve (12) of these tubes were plugged and the remaining three hundred fifty one (351) tubes were left in service using previous and new Additional Roll Expansions and the F-Star (F*) and Elevated F-Star (EF*) alternate repair criteria.

As a result of the visual and eddy current inspection, 7.1% (226 of 3171) of the inspected tubes in 22 Steam Generator contained defects requiring repair. Twenty three (23) of these tubes were plugged and the remaining two hundred three (203) tubes were left in service using previous Additional Roll Expansions and the (F*) alternate repair criteria.

No new degradation mechanisms were identified during this inspection.

Background

Table 1 provides data on the Prairie Island Nuclear Generating Plant that is significant for the steam generators.

Table 1: PRAIRIE ISLAND PLANT DATA

Location:	On Mississippi River near Red Wing Minnesota
Nuclear Steam Supply System:	Westinghouse 2-Loop 560 MWE
Steam Generators:	Westinghouse Model 51 Mill-Annealed Alloy 600 Tubing Open Tubesheet Crevices - 2.75 inch hard roll at bottom of tube
Circulating Water:	Mississippi River/Cooling Towers
Secondary Systems Tubing:	Stainless Steel/Carbon Steel
Startup Dates:	Unit 1 - December 16, 1973 Unit 2 - December 21, 1974
Effective Full Power Years as of End of Previous Cycle:	Unit 1 (EOC 20) – 22.4 EFPY Unit 2 (EOC 20) – 23.2 EFPY
Hot Leg Temperature:	590 degrees Fahrenheit

Causes of Major Tube Degradation

There is one major cause of the degradation of tubes in Unit 2 steam generators. Primary water stress corrosion cracking is occurring at the roll transition zones in this partial depth tubesheet expansion plant. To a minor extent, secondary side intergranular attack and stress corrosion cracking (IGA/SCC or ODSCC) is occurring in the hot leg tubesheet crevice region. The remaining significant degradation is wastage or thinning at the cold leg tube support plates on the outer periphery of the tube bundle. Wastage was characterized by a tube pull in 1980.

Condition Monitoring

Condition Monitoring evaluates the as found condition of the steam generator tubing against leakage and structural integrity criteria. There were no tubes identified which exceeded the structural integrity requirement of no tube burst at three times the normal operating differential pressure or 1.4 times the main steam line break pressure. Degradation mechanisms located in the tubesheet crevice region cannot burst due to the constraints of the tubesheet. Axial degradation mechanisms are not expected to burst unless the indication is greater than 0.38 inches long in the free span. There were no tubes identified by in situ pressure testing which exceeded leakage limits at main steam line break conditions.

In Situ Tests

To demonstrate adequate leakage and structural integrity, eight tubes were pressure tested in situ. Tubes were selected based on largest extent and voltage of the eddy current indications. Tests were done at Main Steam Line Break (MSLB) conditions for indications in the tubesheet crevice region. Tests were done at Main Steam Line Break pressure and at three times normal operating differential pressure (3dp) for indications in free span regions. The test pressure for Main Steam Line Break conditions was 2816 psig and for 3dp conditions was 5256 psig. The list of tubes tested in situ is in Attachment 4. No tubes challenged the structural integrity criteria of 3 times normal operating differential pressure. No tubes leaked at Main Steam Line Break pressures.

Operational Assessment

Unit 2 Cycle 20 length was 567 EFPD. Unit 2 Cycle 21 length is planned to be 550 EFPD.

Primary to secondary leakage during the operating cycle was below the detectable limit (<0.5 GPD), based on tritium in the SG blowdown. There was no detectable gross activity in liquid SG blowdown samples and no detectable activity at the condenser air ejector discharge during the cycle. Secondary side hydrostatic tests for leakage were not performed since there was no detectable primary to secondary side leakage during the previous cycle.

The expected severity of tubing degradation at the end of cycle 21 was projected to determine if required structural and leakage integrity margins will be maintained during the next cycle of operation. The scope of this evaluation included the following forms of tubing degradation:

- Cold leg thinning
- Wear at AVBs
- Postulated Row 1 and Row 2 Axial PWSCC at U-Bends
- Circumferential PWSCC near U-Bend Tangent Points
- Axial ODSCC in the Tubesheet Crevice Region
- Axial PWSCC Near Partial Depth Expansion Transitions
- Axial PWSCC at Tube Ends

Bounding deterministic operational assessments were performed. All input was considered at 95th percentile bounding values. An evaluation of projected worst case EOC structural and leakage integrity margins shows that full cycle operation (1.507 EFPY) is warranted.

Detailed Monte Carlo simulations of projected tube degradation for postulated axial PWSCC in Row 1 and Row 2 U-bends confirmed the conservative nature of the

bounding deterministic approach when all input is considered at 95th percentile bounding levels. Circumferential PWSCC at U-bends is bounded by the more conservative axial analysis.

Remedial Actions

Northern States Power has participated in utility funded research on steam generator related issues beginning with the Steam Generator Owners Group II in 1982 and continuing to the present EPRI funded Steam Generator Management Project. Remedial actions to reduce and/or prevent tube degradation due to primary water stress corrosion cracking and secondary side IGA/SCC have been used by the industry with only limited success. Prairie Island has evaluated, and in most cases, implemented the following remedial actions:

Reduced Operating Temperature: Prairie Island has been a low temperature plant having operated with T_{hot} at 590 °F since startup. This has slowed, but not eliminated, growth of PWSCC and IGA/SCC in the Prairie Island steam generators. Additional temperature reduction has not been warranted.

Chemistry Control: Prairie Island has used state of the art analytical equipment since startup and has followed both the original equipment manufacturer's water chemistry guidelines as well as the EPRI secondary water chemistry guidelines. The amounts of material found from hideout return tests during shutdowns have been small. Steam generators are sludge lanced every other outage on a cycling basis with less than 80 pounds of sludge removed from the steam generator per outage. The PWSCC degradation is relatively independent of chemistry and occurs in regions of high residual stress. Plasticor repairs of the condenser tubesheets have reduced circulating water in leakage to a very low level.

High Hydrazine Control: Prairie Island maintains a hydrazine control band of 125 +/- 25 ppb.

Molar ratio control to reduce secondary side corrosion: Molar ratio control has been attempted by adjustments to steam generator blowdown resin ratios during the last operating cycle. Operating molar ratios are normally less than 1. The object of molar ratio control is to maintain the cation to anion ratio (sodium to chloride plus sulfate) at less than one so that free sodium hydroxide cannot form in the crevice regions.

Conduct Crevice Flushing Operations with Boric Acid: Prairie Island started crevice flushing in 1986 using two days of time. Since then, boric acid and titanium dioxide inhibitors were added to the crevice flushing procedure. Crevice flushing was last done on Unit 2 in 1997.

On-line addition of Boric Acid: Following the report of favorable laboratory results in 1986, Prairie Island began on-line addition of boric acid in Unit 1 in March 1987. The effectiveness of this remedial action remains controversial within the industry (EPRI IGA/SCC workshops in May 1991 and December 1992). Prairie Island has continued to use boric acid as an inhibitor for secondary side IGA/SCC. One of the recommended boric acid practices, low power soaks, has not been implemented at Prairie Island. There are very few tubes that have indications of OD IGA/SCC in Unit 2.

Use of other chemical inhibitors: At the present time, NSP supports EPRI research for other chemical inhibitors. Our current evaluations are centered around the use of titanium compounds to inhibit the growth of IGA/SCC. A titanium chelate, TYZOR LA Titanate has been added since January 1994.

Preventive sleeving: Sleeving is one method of reducing the probability of tube leak outages. The down side of preventive sleeving is the inability to follow the degradation mechanism and the reduction in the ability to examine tube support plate intersections above the sleeves. NSP has made the strategic decision to sleeve on an as-needed basis, to insure that we are able to best follow the tube support plate problems and to reduce our overall cost of steam generator repair and maintenance. Sleeving has not been required in Unit 2 due to the high success with additional roll expansions and the F* and EF* Repair Criteria.

F* and EF* Repair Criteria: The F-Star and EF-Star Alternate Repair Criteria allow tubes to remain in service with indications below the F* or EF* distance. Additional Roll Expansion adds a new F* or EF* distance to the steam generator tubing and allows additional tubes to remain in service that have degradation in the lower tubesheet crevice region.

Detailed Inspection Plans: Although not a recommendation for remedial actions, but rather a current inspection guideline, 100% of the full length of all tubes in service are routinely examined at Prairie Island. This was started in 1982. In addition, all tubes with indications that cannot be quantified, such as NQIs, DSIs, MBMs (in the tubesheet) are examined with the rotating coil probe due to its higher sensitivity. Repair decisions, in those cases, are based on the RPC results.

ATTACHMENT 3

PRAIRIE ISLAND UNIT 2
FEBRUARY 2002 IN SITU PRESSURE TESTS

Steam Generator 21

TUBE LOCATION	ROW 3	COL17	
	Target Pressure	Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

TUBE LOCATION	ROW 9	COL18	
	Target Pressure	Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

TUBE LOCATION	ROW 14	COL 28	
	Target Pressure	Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

TUBE LOCATION	ROW 23	COL 31	
	Target Pressure	Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

Results: ZERO Leakage and NO Burst at Final Pressure for all Tubes

Steam Generator 22

TUBE LOCATION	ROW 13 Target Pressure	COL 29 Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
1ST INTERMEDIATE	3316	3400	2 min
2ND INTERMEDIATE	3816	3900	2 min
3RD INTERMEDIATE	4316	4400	2 min
4RTH INTERMEDIATE	4816	4900	2 min
3 x Normal Operating Delta P	5256	5300	5 min

TUBE LOCATION	ROW 2 Target Pressure	COL 31 Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

TUBE LOCATION	ROW 14 Target Pressure	COL 41 Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

TUBE LOCATION	ROW 19 Target Pressure	COL 47 Actual Pressure	Hold Time
Normal Operating Delta P	1752	1800	5 min
Main Steam Line Break	2816	2900	5 min
3 x Normal Operating Delta P	N/A	N/A	N/A

Results: ZERO Leakage and NO Burst at Final Pressure for all Tubes

Post Pressure Test Examinations

SG	Row	Col	Indication	Location	Voltage	Reason	Length Inch	Width Degree	Leakage Result	Max Pressure	Eddy Current Change
21	3	17	SAI	TRH+0.07to+0.13	0.38	RTZ PWSCC	0.06		0	2816	No
21	9	18	MAI	TRH+0.14to+0.24	0.46	RTZ PWSCC	0.10		0	2816	No
21	14	28	SAI	1BH+16.67to+16.86	0.35	Crevice ODSCC	0.19		0	2816	Yes
21	23	31	MAI	1BH+16.79to+17.29	0.66	Crevice ODSCC	0.50		0	2816	Yes
22	13	29	SAI	TSH+0.25to+0.75	0.09	Free Span ODSCC	0.50		0	5256	Yes
22	2	31	SAI	TRH+5.86to+6.24	0.34	Crevice PWSCC	0.38		0	2816	No
22	14	41	MAI	1BH+17.29to+17.75	0.08	Crevice ODSCC	0.46		0	2816	Yes
22	19	47	MAI	TRH+17.82to+18.38	0.14	Crevice ODSCC	0.56		0	2816	Yes