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Dominion

September 23, 2004

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

Serial No.	04-333
MPS Lic/WDB	R2
Docket No.	50-336
License No.	DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING STEAM GENERATOR TUBE INSPECTION SUMMARY FOR FALL 2003 OUTAGE

In letters dated November 5, 2003, and February 26, 2004, Dominion Nuclear Connecticut, Inc. (DNC) submitted to the U. S. Nuclear Regulatory Commission (NRC) the fall 2003 refueling outage steam generator tube plugging and inspection summary reports for Millstone Power Station Unit 2.

In a letter dated June 1, 2004, the NRC requested from DNC additional information required to complete the evaluation of the submitted reports.

Attachment 1 of this letter provides the response to the request for additional information.

If you have any questions or require additional information, please contact Mr. Paul R. Willoughby at (804) 273-3572.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachment

Commitments made in this letter: None.

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Attachment 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING STEAM GENERATOR TUBE INSPECTION SUMMARY FOR FALL 2003 OUTAGE

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Dominion Nuclear Connecticut, Inc. (DNC)

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Below is the response to the request for additional information.

Question Number 1

The steam generators (SGs) at Millstone Power Station Unit 2 (MPS2) were replaced in 1993 with SGs designed and fabricated by Babcock and Wilcox International. In several locations, the reports reference tube support structures (e.g., 01H) and tube locations (e.g., Row 140 Column 79). In order for the staff to better understand the location of the indications, provide a schematic of the MP2 SGs, which depicts the tube support naming conventions. In addition, provide the following general design information: tube manufacturer, tube support (including fan bar) thickness, Fan Bar Material (e.g., Type 410 Stainless steel), and the radius of the smallest radii tube. In addition, discuss whether measurements from a tube support are from the middle of the support or the edge of the support (e.g., does F02 minus 0.6 inches specify an indication 0.6 inches from the bottom edge of the second fan bar).

Response

Excerpts from the "Unit 2 Steam Generator Eddy Current Data Analysis Reference Manual" are provided in Appendix A. These excerpts provide the general design information and analysis guidance for locating indications.

- Steam Generator Design
- Steam Generator Tube Measurements
- Location of Fan Bar Contact Points in Each Row
- Steam Generator Tube Support Location Measurements
- Steam Generator Dimensions
- Steam Generator Arrangement
- Lattice Grid Structure (Supports 2-7)
- Lattice Grid Structure (Supports 1)
- Fan Bar Support to Tube Interface
- Hot Leg Tubesheet Map
- Layout of Crossover Tubes (Row 1-3)

- Tube to Tubesheet Interface
- Steam Generator Tubes Plugged
- Reference Indication to Structure (9.6.16 - 9.6.18)
- Illustration of Flaw Locations

The following specific information is provided as requested:

- Tube Manufacturer: Valinox
- Tube Support (Including Fan Bar) Thickness: 0.1 inch
- Fan Bar Material: Type 410 SS
- Radius Of The Smallest Radii Tube: 3.905 inches
- Measurements From Supports: Indication locations are referenced from the center of the tube supports, top-of-tubesheet, or the tube end, as appropriate. They are identified in a positive direction from the closest lower structure (including tube end) unless located within two inches of the top-of-tubesheet, the center of a lattice grid support, or the center of a fan bar support. In these cases, the indications are reported from the centerline of the structure in the positive or negative direction as appropriate. A tubesheet minus measurement may be used where no tube end was recorded. See Appendix A "Reference Indication to Structure (9.6.16 - 9.6.18)".

Question Number 2

A few tubes were reported with dent and ding indications. Please clarify your reporting threshold for dents and dings and discuss whether the calibration procedure (for measuring the size of the dents and dings) is consistent with that described in Generic Letter 95-05 (or with industry guidelines). Also, discuss whether the dents and dings found during Refueling Outage 15 (R15) inspections were traceable back to your baseline inspection and discuss any changes in magnitude. If the dents and dings are not traceable to your baseline inspection and/or have changed in magnitude, discuss the reason for any change. Please discuss the results of any rotating probe inspection at dents and dings, including any anomalies.

Response

Calibration

The detection of dents and dings is performed during the bobbin probe inspection. That technique is performed in accordance with Examination Technique Specification Sheet (ETSS) 1, "Bobbin Standard ASME Code Examination for Parent Tubing", which is a part of the "Unit 2 Steam Generator Eddy Current Data Analysis Reference Manual." The calibration for this technique, which is identified within the ETSS, is equivalent to the applicable EPRI ETSS (i.e., 96008.1), and is consistent with EPRI Technical Report, "Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6" (industry guidelines).

Reporting Threshold

The reporting threshold used for dents and dings at MPS2 during R15 was three volts peak-to-peak. Although the MPS2 R15 threshold was three volts peak-to-peak, recent changes implemented at Millstone Power Station have revised the criteria. For any hot leg indication greater than three volts peak-to-peak, the Motorized Rotating Pancake Coil (MRPC) will be reused with a reporting threshold of two volts peak-to-peak. This threshold will be utilized at MPS2 during Refueling Outage 16 (R16).

R15 Dents and Dings

During R15 eight thousand five hundred and twenty-three (8523) bobbin examinations were performed. Of that, twenty-two dents/dings were identified in twenty tubes or 0.26% of the tubes. Identification of dents and dings has been widely experienced throughout the industry, although previous experience did not receive the current level of attention. The recording criteria, which has been utilized at MPS2 for the past several outages has included the incorporation of industry operating experience (i.e., OE). This operating experience has resulted in revisions to the dent and ding analysis flow charts to support the detection of Outside Diameter Stress Corrosion Cracking (i.e., ODSCC) within dents or dings.

MPS2 reported 22 dents and dings during R15. Most of these indications were directly traceable to baseline indications. Although comparisons of the voltage are provided, as requested, a change in magnitude is not necessarily relevant or even comparable. Sixteen of the twenty-two reported indications have decreased in amplitude since their discovery. Two of the remaining six indications were first identified in R15 and were slightly above the reporting criteria. The four remaining indications have increased 0.21, 0.33, 0.7, and 0.77 volts since the time of discovery.

There are many possible reasons why the remaining six indications were not identified in the baseline and/or why changes exist in the baseline voltage amplitude. These are:

- Testing equipment and techniques have changed and/or significantly improved since 1991.
- Distance changes between the inspection coils and tube wall due to probe diameter. The baseline examinations at MPS2 were performed using 0.600-inch probes, whereas the R15 examinations utilized 0.610 inch probes for better fill factor. This results in a change in diametral offset of the probe.
- The qualified techniques per Appendix H, "Performance Demonstration for Eddy Current Examinations" of EPRI Technical Report, "Pressurized Water Reactor

Steam Generator Examination Guidelines: Revision 6," have increased detectability.

- More attention/scrutiny is paid to dents and dings in the industry today than during examinations performed in the 1991 timeframe. Consequently, there were fewer MRPC examinations performed during the baseline examinations.

- The current Millstone procedure methodology for establishing calibration sensitivity is consistent with the current industry guidelines. The current sensitivity is established by setting the 4 x 20% flat-bottom holes equal to four volts peak-to-peak. However, the calibration sensitivities for the baseline examination were established by setting the 4 x 100% through-wall holes equal to six volts peak-to-peak. This difference accounts for some voltage differences.

- In 1991, MPS2 performed a 100 % baseline examination of both steam generators, prior to their installation in the plant. At the time of examination the steam generators were in a horizontal position. Due to gravity the location of the bobbin probe would be at the bottom of the tube. This would increase the distance between the inspection coils and the upper tube wall, which would not occur when the steam generator was installed vertically (i.e., diametral offset of the probe within the tube). The significance is that an indication on the top of the tube (with the tube in a horizontal position) would be farther away from the coil due to gravity. Also, as the positioning tangs on the probe wore (i.e., bottom tangs got shorter), the coil would drift even farther away from an indication. As the distance increases between the coil and indication, the voltage amplitude decreases. Consequently, when the steam generator was installed vertically, the exact same size indication will provide a much larger voltage (indicating significant growth) due to probe proximity (i.e., probe is now centered vs. on bottom of tube).

Appendix B, "Ding/Dent Indications, Steam Generator No. 2," reviews each tube reported with a dent or ding during R15. Also, the trending information section identifies when the indication was found, initial voltage amplitude, R15 voltage amplitude, any Rotating Pancake Coil (RPC) testing and results, and possible explanations for changes in the voltage amplitude changes.

<u>Rotating Probe Results</u>

The higher temperature/susceptibility of dents in the hot leg will likely lead to cracking prior to the cold leg and U-bend dents. Consequently, all the hot leg dents and dings are monitored (i.e., have been tested with the RPC at least twice since initial discovery). All the RPC examinations were classified as No Degradation Detected (NDD) or No Degradation Found (NDF).

Question Number 3

A few tubes were reported to have a possible loose part indication (PLP). Some of the tubes with these indications are in the interior of the tube bundle. Please clarify whether the tubes with PLP signals were visually inspected to confirm the nature of these PLPs. If visual inspections were not performed and/or if the part was not remove, discuss what analyses were performed to ensure these PLPs do not compromise tube integrity for the period of time between inspections.

Response

During R15, eddy current testing identified five PLPs with indications of damage just below the first support plate interior to the tube bundle. These locations are identified on Table 1, "Tubes with Loose Parts and Indications Identified in 2R15".

Table 1-Tubes with Loose Parts and Indications Identified in 2R15

Row	Col	SG	Part Removed	Percent Throughwall	Support Identifier	Inches from Support Center
28	5	2	Yes	23	01C	-2.44
59	10	2	Yes	21	01C	-6.69
123	46	2	Yes	20	01H	-6.57
125	48	2	Yes	24	01H	-4.96
126	49	2	Yes	24	01H	-4.47

A remote visual inspection was performed at each location identified in Table 1. These inspections confirmed the presence of foreign material at each identified location (i.e., just below the first support plate). The Foreign Object Search and Retrieval (FOSAR) team removed all the foreign material at these locations. Seven segments of flexitallic gasket ranging from approximately 4 inches to 14 inches long were removed. During the in-bundle visual inspection, four new locations were identified with irretrievable flexitallic gasket. However, the flexitallic gasket was located on the tube sheet. Historical experience has shown that material in-bundle and on the tubesheet does not damage the tubes. These four locations are included on Table 2, "Foreign Material Remaining in Steam Generators". All irretrievable foreign material identified and remaining in either steam generator to date is identified in Table 2.

In addition to the above PLPs, the R15 eddy current examination identified other PLP signals with no indication of degradation. These indications were located slightly above the top-of-tubesheet on the hot side. All these PLPs had been previously identified and evaluated during R13. The R15 eddy current testing determined that degradation did not exist at these locations. Consequently, R15 testing confirms a zero wear rate for these locations. This is identified in Table 2.

Table 2- Foreign Material Remaining in Steam Generators

Foreign Object	Identified Evaluation	Location		Est. Size	% Indication	Comments
		SG	Row / Column			
Flex	R13 CR-00-1234	2	R50, C7 R52, C7	~4" x 1/4" x 0.013"	0	No indication RF15 Wear rate = 0
Flex	R13 CR-00-1234	2	R44, C85 R46, C86	~4" x 1/4" x 0.013"	0	No indication RF15 Wear rate = 0
Weld Rod	R13 CR-00-1234	2	R27, C20 R26, C21 R29, C20 R28, C21	1/8" dia x 5"	0	No indication RF15 Wear rate = 0
Weld Rod	R13 CR-00-1234	2	R94, C129 R96, C129 R98, C129 R100, C129 R102, C129 R93, C130 R95, C130 R97, C130 R99, C130 R101, C130 R101, C130	1/8" dia x 8"	0	No indication RF15 Wear rate = 0
Weld Rod	R13 CR-00-1234	2	R45, C36 R46, C37 R47, C36	1/8" dia x 5"	0	No indication RF15 Wear rate = 0
Spacer	R13 CR-00-1234	2	R93, C40 R94, C139 R95, C140	1/8" inch nut, ~1.5" long	0	No indication RF15 Wear rate = 0
Weld Slag	R14 CR-02-01863	1 Cold	R24, C101 R23, C102 R24, C103 R25, C102	1.5" x 3/8" x 1/8"	0	Stainless steel. Present since 1994 per ECT Wear rate = 0
Flex	R15 CR-03-10511	2 Hot	R32, C5 R33, C4 R34, C5	~4" x 1/4" x 0.013	0	
Flex	R15 CR-03-10511	2 Hot	R133, C110 R132, C111	~4" x 1/4" x 0.013	0	
Flex	R15 CR-03-10511	2 Hot	R123, C122 R123, C121	~4" x 1/4" x 0.013	0	
Flex	R15 CR-03-10511	2 Hot	R134, C109 R135, C108	~4" x 1/4" x 0.013	0	
Screw	R13 CR-00-1223	1		#6, 5/8", 1.19 oz	0	Very small screw, fell out of Snapon ratchet. Location unknown

Question Number 4

Several tubes were identified that have bulges. Please discuss whether these indications were in the baseline inspection and discuss any changes in size, discuss the reason for any changes. If the bulges are not traceable to your baseline inspection and/or have changed in size, discuss the reason for any change. Please discuss whether these indications were inspected with a rotating probe.

Response

Table 3 addresses the bulges identified during R15.

Table 3- Bulges Identified During R15

		R15			1991 Baseline			Indication	
Row	Col.	Indication	Voltage	Location	Indication	Voltage	Location	Reported	Notes
80	31	BLG	4.68	07H	BLG	7.21	H07	Yes	1,2
9	34	BLG	3.12	TSH				No	2, 3
2	35	BLG	4.59	07H				No	2

Notes

1 Tested with RPC during Preservice.
2. Tested with RPC during R15. No degradation found.
3. R15 voltage is slightly greater than the reporting voltage 3 volts. The reported voltage is well within the uncertainties established for eddy current testing.

During the baseline examination, calibration sensitivities were established by setting the 4 x 100% through-wall holes equal to six volts peak-to-peak. Currently, for bobbin examinations, voltage normalization is accomplished utilizing the primary differential channel on the four 20% flat bottom holes of the ASME standard, with a normalized peak-to-peak voltage of four volts. These calibration differences alone could be what raised the voltage slightly above the reporting criteria for tube R9 C34. Other possible explanations for the amplitude changes include (but are not limited to):

- Changes and significant improvements in testing equipment techniques since 1991.
- Steam generator position during examination (e.g., horizontal vs. vertical)
- Distance changes between the inspection coils and tube wall due to probe diameter (i.e., the baseline examinations were performed using 0.600 inch probes, whereas the R15 examinations utilized 0.610 inch probes for better fill factor).

- Different diametrical offset of the probe within the tube, and
- Probe wear.

Question Number 5

Please clarify the number of tubes in each of the two SGs and discuss whether any tubes were plugged prior to commercial operation.

Response

During the construction of Steam Generator 1, a drill bit broke while drilling the hot leg tubesheet at location R57 C156. As a result of the associated damage, that hot leg location was plugged and the associated cold leg hole was never drilled. Currently this plug is the only plug in either steam generator. (See Appendix A, Reference Manual Excerpts, Page 40, "Steam Generator Tubes Plugged"). Consequently, Steam Generator 1 has 8522 active tubes and Steam Generator 2 has 8523 active tubes.

Question Number 6

In your report you indicate that tube-to-tube contact occurs primarily in the tube U-bends and is caused from tube bowing between supports. Please discuss whether any tube-to-tube contact has been observed at MP2. Please discuss whether the number of tubes affected has increased/decreased since the SGs were installed. If tube-to-tube contact is occurring, please discuss the effects on the eddy current inspection including the ability to detect loose parts.

Response

To date no tube-to-tube contact has been identified in either steam generator.

Attachment 1
Appendix A

MILLSTONE POWER STATION UNIT 2
STEAM GENERATOR EDDY CURRENT DATA ANALYSIS
REFERENCE MANUAL EXCERPTS

Millstone Power Station Unit 2
Dominion Nuclear Connecticut, Inc. (DNC)

Millstone Power Station Unit 2
Steam Generator Eddy Current Data Analysis Reference Manual Excerpts

The following pages have been excerpted from U2-24-SIP-REF01, "Unit 2 Steam Generator Eddy Current Data Analysis Reference Manual."

5. STEAM GENERATOR DESIGN

Millstone Unit 2 is a Combustion Engineering two-loop pressurized water reactor with replacement SGs manufactured by Babcock and Wilcox Canada. Each SG was designed to contain 8,523 U-bend, thermally treated Inconel 690 tubes. The SG primary head divider plate divides the head into two separate plenums. The plenums are identified as hot leg (inlet) and cold leg (outlet). The SG arrangement is shown in Figure 5-1.

Secondary side tube support structures include seven lattice grid supports in the straight leg section of the tubes, and twelve fan bar assemblies in the U-bend section of the tubes. Measurements of the straight tube portion of the support structure are provided in Table 5-1. All lattice grid supports are full supports. The lattice grid for Support 1, shown in Figure 5-3, is made up of high bars (3.15 inch wide), medium bars (2.562 inch wide) and low bars (1.00 inch wide). The lattice grid for Supports 2 through 7, shown in Figure 5.2, is made up of high bars and low bars. Table 5-2 and Figure 5-4 provide the relationship between the fan bar assemblies and rows of tubes. The fan bars are of various widths and the two fan bars at a given tube/fan bar intersection are offset from one another. This offset distance varies from one fan bar to another.

The tubesheet is drilled on a triangular, 1inch pitch. Each tube is identified by a line and row number. There are 167 lines and 141 rows in each SG. Figure 5-5 shows a hot leg tube sheet map. To minimize small radius bends the origin and termination of tubes in rows 1 through 3 differ between the hot leg and cold leg. Figure 5-6 shows the relationship between hot leg origin and cold leg termination for rows 1 through 3. Tube identification is taken from the hot leg location.

The tubes are hydraulically expanded over the full depth of the tubesheet. The tubing is nominal 0.750 inch outside diameter with a 0.0445 inch nominal wall thickness. The tubing was produced using a pilgering process which generates minor geometry variations on the ID surface. Figure 5-7 shows the nominal dimensions of a tube-to-tubesheet expansion region. Table 5-3 shows the location of the tube supports along the tube length. Various SG dimensions are provided in Table 5-4.

Table 5-1
Steam Generator Tube Measurements
Millstone Unit 2

Row	U-Bend Radius (Inches)	U-Bend Arc Length (Inches)	Straight Leg Length (Feet)
1	4.272	13.421	24.834
2	3.968	12.466	24.955
3	3.905	12.268	25.056
4	4.000	12.566	25.144
5	4.500	14.137	25.150
. . .	. . .	. . .	. . .
18	11.000	34.558	25.232
19	11.500	36.128	25.238
. . .	. . .	. . .	. . .
140	72.000	226.195	25.994
141	72.500	227.765	26.000

Table 5-2
Location Of Fan Bar Contact Points In Each Tube Row
Millstone Unit 2 Steam Generators

ROW NUMBER	FAN BAR CONTACT POINTS											
	F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	F11	F12
1 - 5	X											X
6 - 21	X					X	X					X
22 - 34	X				X	X	X	X				X
35 - 50	X			X	X	X	X	X	X			X
51 - 71	X		X	X	X	X	X	X	X	X		X
72 - 141	X	X	X	X	X	X	X	X	X	X	X	X

Table 5-3
Steam Generator Tube Support Location Measurements
Millstone Unit 2

Location	Inches From Tube End	Center to Center Spacing	Set Scale
Tube End	0.00		
Top of Tubesheet	22.25	22.25	22.3
#1 Lattice Grid	46.25	24.00*	24.0
#2 Lattice Grid	81.375	35.125	35.1
#3 Lattice Grid	123.0	41.625	41.6
#4 Lattice Grid	164.625	41.625	41.6
#5 Lattice Grid	206.25	41.625	41.6
#6 Lattice Grid	247.875	41.625	41.6
#7 Lattice Grid	289.5	41.625	41.6

*Measurement from top edge of tubesheet to center of #1 Lattice Grid.

Table 5-4
Steam Generator Dimensions
Millstone Unit 2

MILLSTONE UNIT 2 STEAM GENERATOR DIMENSIONS	
Number of Tubes:	8523
Tube Material:	Inconel 690 Thermally Treated
OD of Tubes:	0.750"
Tube Wall Thickness:	0.0445"
Number of Lattice Grid Supports:	7
Lattice Grid Material:	Type 410 SS
Number of Fan Bar Assemblies:	12
Fan Bar Material	Type 410 SS
Fan Bar Thickness	0.112"
Fan Bar Width	Various (1.00", 2.562", 3.15")
Tubesheet Thickness	21.75"
Expansion Method	Hydraulic
Extent of Expansion	Full through Tubesheet
Tube Pitch	1.0"
Row 1 Radius	4.272"
Row 3 Radius (Smallest Radius)	3.905"
Bottom Tube Sheet Cladding	I82
Clad Thickness	0.31"
Tube End Location	0.50" Below Bottom of Tubesheet

Figure 5-1
Millstone Unit 2 Steam Generator Arrangement

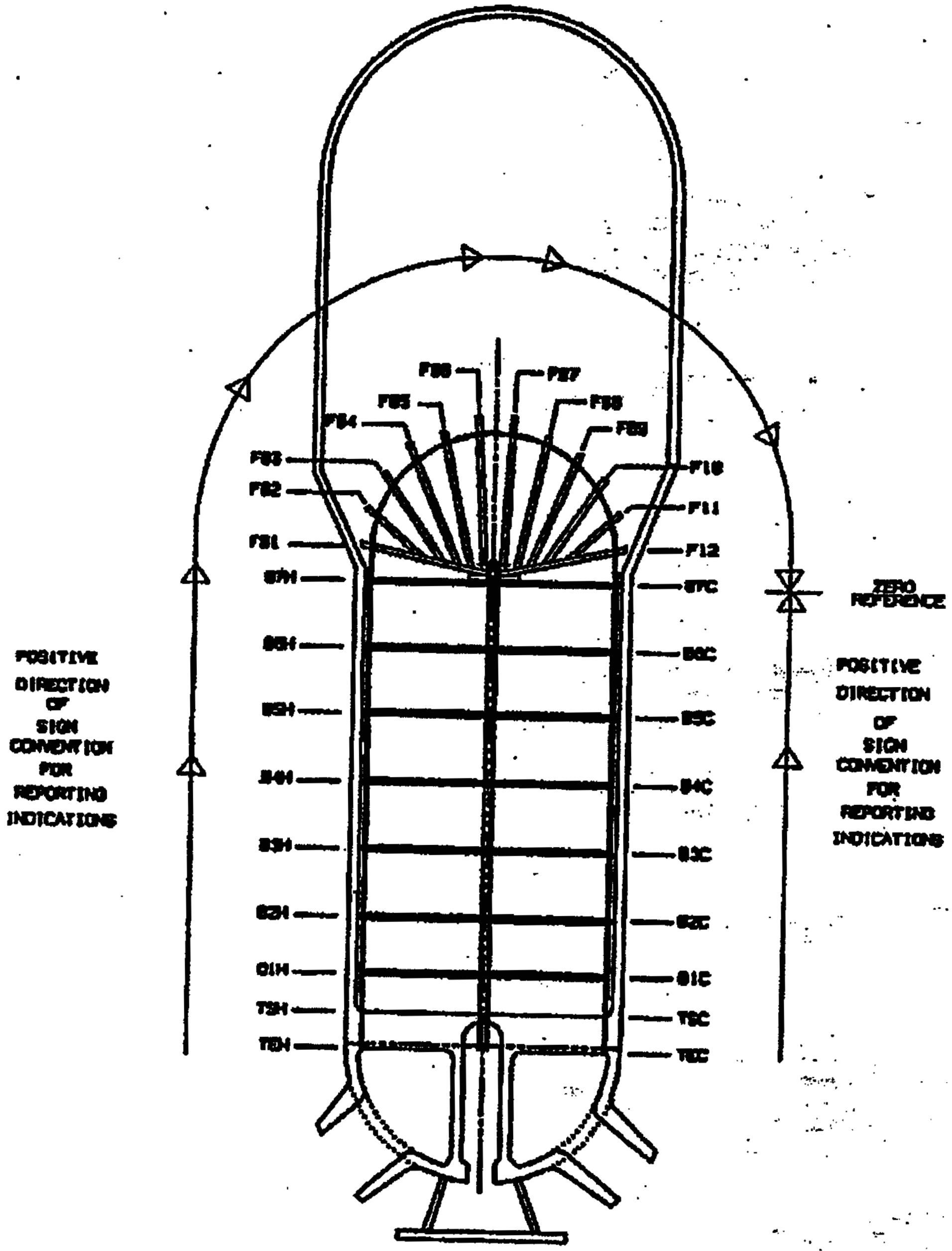
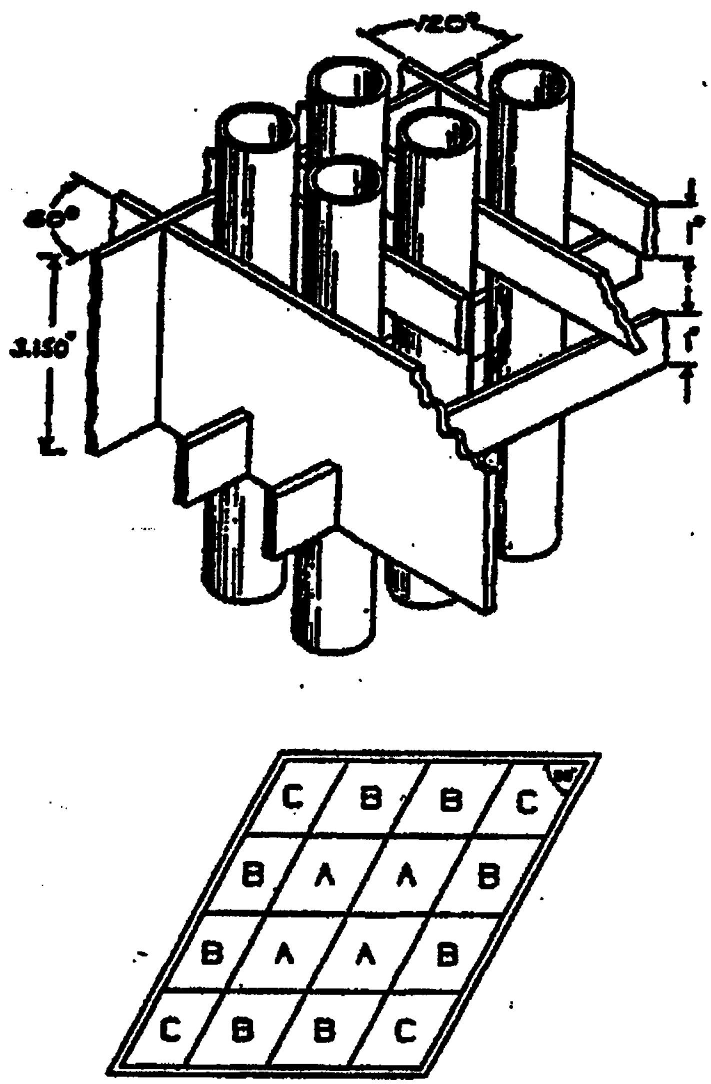
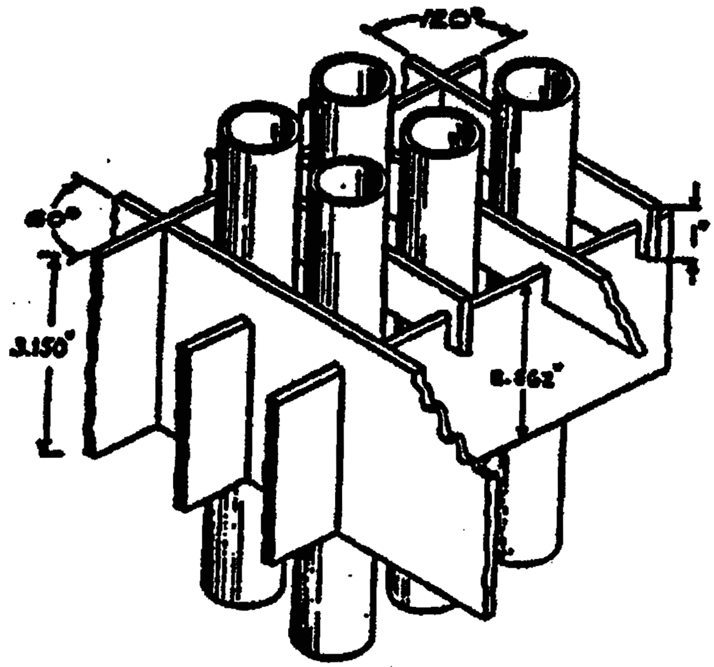


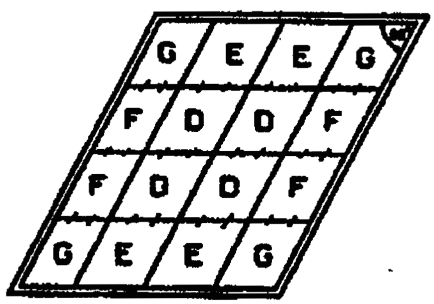
Figure 5-2
Lattice Grid Structure (Supports 2 through 7)



— LOW BAR 1.0" H x 0.1" THICK
═ HIGH BAR 3.15"H x 0.1" THICK
A - 4 LOW BARS
B - 3 LOW BARS, 1 HIGH BAR
C - 2 LOW BARS, 2 HIGH BARS

Figure 5-3
Lattice Grid Structure (Support 1)





MEDIUM BAR - 2.562" W x 0.1" THICK
LOW BAR 1.0" W x 0.1" THICK
HIGH BAR 3.15"W x 0.1" THICK

D - 2 LOW BARS, 2 MEDIUM BARS
E - 2 LOW BARS, 1 MEDIUM BAR, 1 HIGH BAR
F - 1 LOW BAR, 2 MEDIUM BARS, 1 HIGH BAR
G - 1 LOW BAR, 1 MEDIUM BAR, 2 HIGH BARS

Figure 5-4
Fan Bar Support to Tube Interface

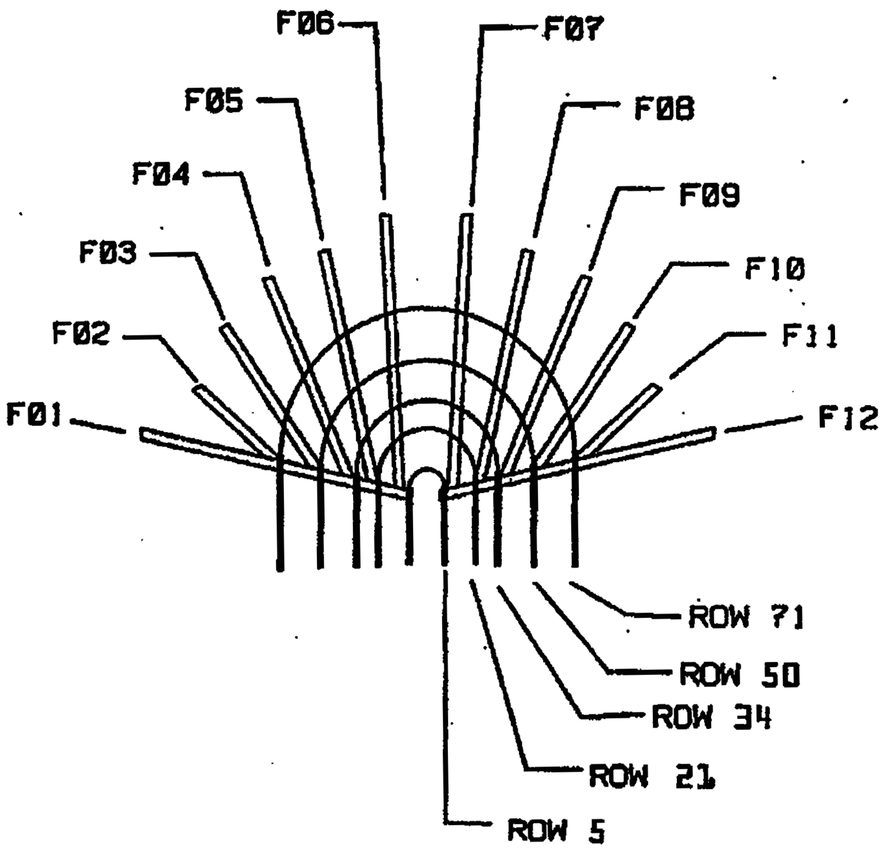


Figure 5-5
Hot Leg Tubesheet Map

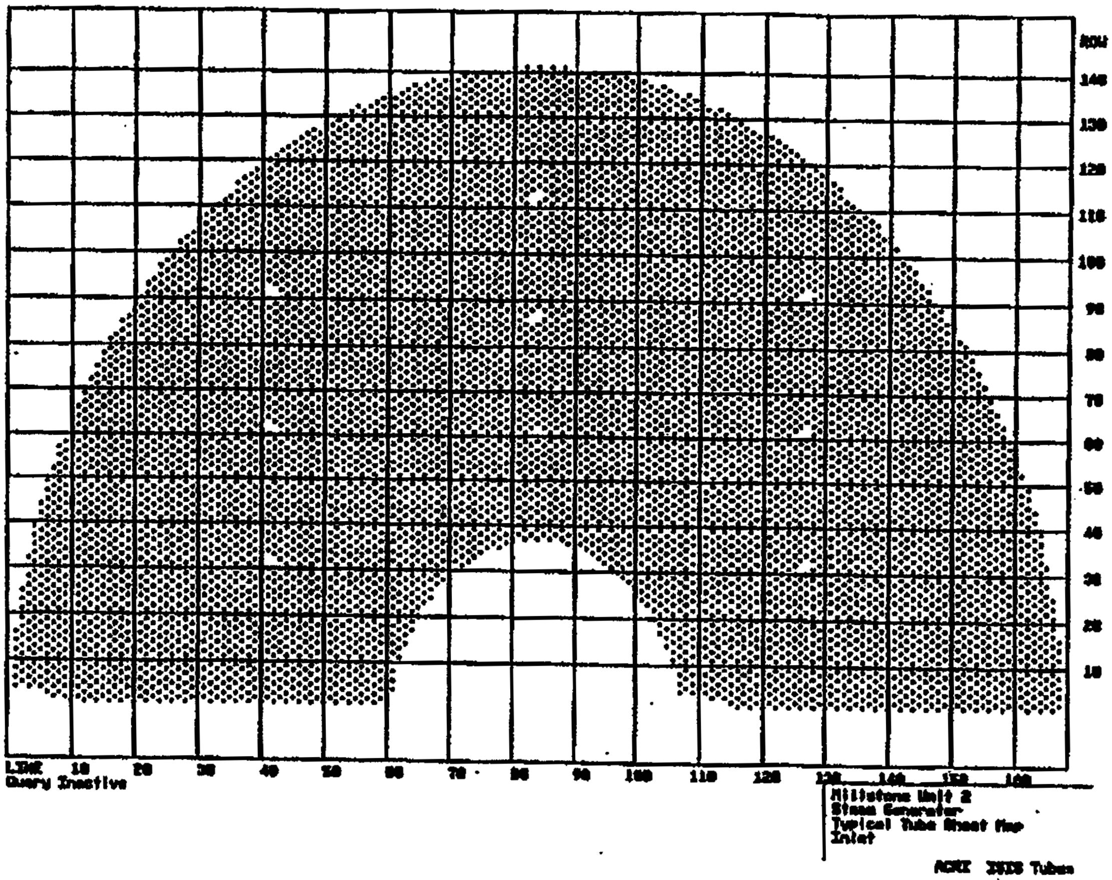


Figure 5-6
Layout of Crossover Tubes (Row 1 to 3)
Viewed From Primary Side

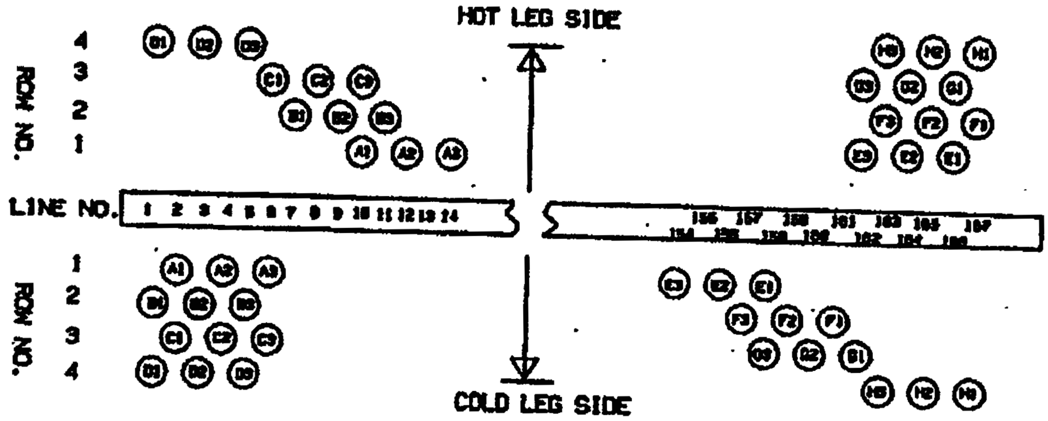


Figure 5-7
Tube to Tubesheet Interface

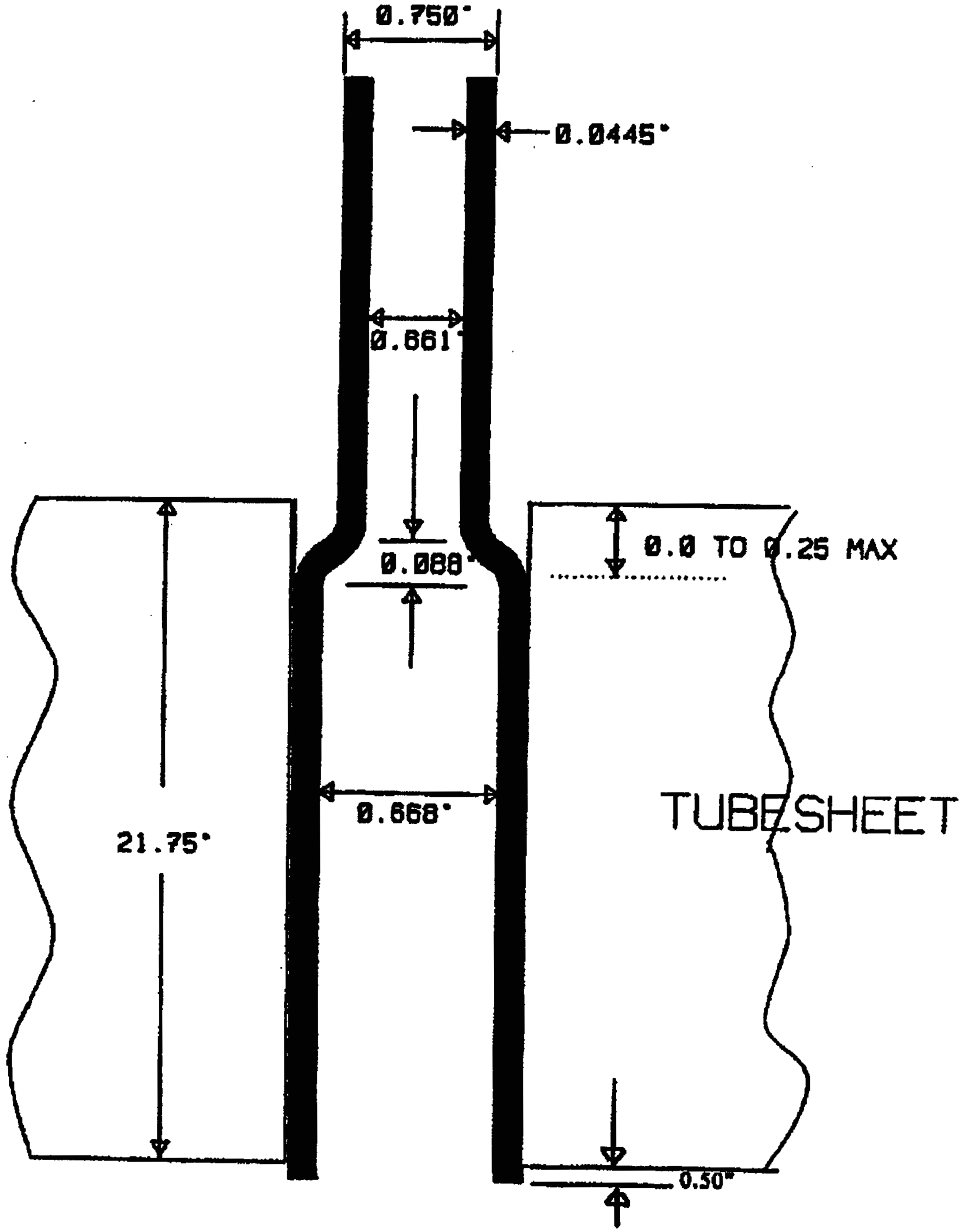


Table 6-10
Steam Generator Tubes Plugged
Millstone Unit 2

	SG#	Row	Line	%TW	Location	Volts	Reason
Fabrication	1	57	156				Broken Drill Bit (plugged hot side only; cold side not drilled)

9.6.12 **Volt Peak-to-Peak** is the preferred phase angle measurement. For cases where no clear transition exists, a Volts Peak-to-Peak measurement shall be used. Volts Max Rate may be used for signals having a well-defined transition. Guess Angle may only be used by the Resolution or Senior Analysts and only when the latter two methods do not give a good representation of the signal phase angle.

9.6.13 Tube to tube contact (or tubes in close proximity) with a voltage equal to or greater than 1 volt vert max shall have a from-to location and a vert max voltage measurement made from the 130 kHz absolute channel (CH 6).

9.6.14 All indications of tube wall degradation which can be sized, must be sized, and the through wall depth and axial location shall be reported. Those which cannot be sized shall be reported as an I-Code.

9.6.15 For all indications greater than or equal to 20% through wall and "I" codes, a reevaluation of previous examination data shall be performed.

9.6.16 Indication locations shall be referenced from the center of the tube supports, top-of-tubesheet, or tube end, as appropriate. The analyst shall refer to Figure 5-4 when referencing the fan bar number, which is dependent upon the tube row number.

9.6.17 All indication locations shall be measured in a positive direction from the closest lower structure (including tube end), except as follows:

a. Those indications located within 2.0 inches of the top-of-tubesheet, center of a lattice grid support, or center of a fan bar support shall be reported from the centerline of the structure in the positive (+) or negative (-) direction, as applicable.

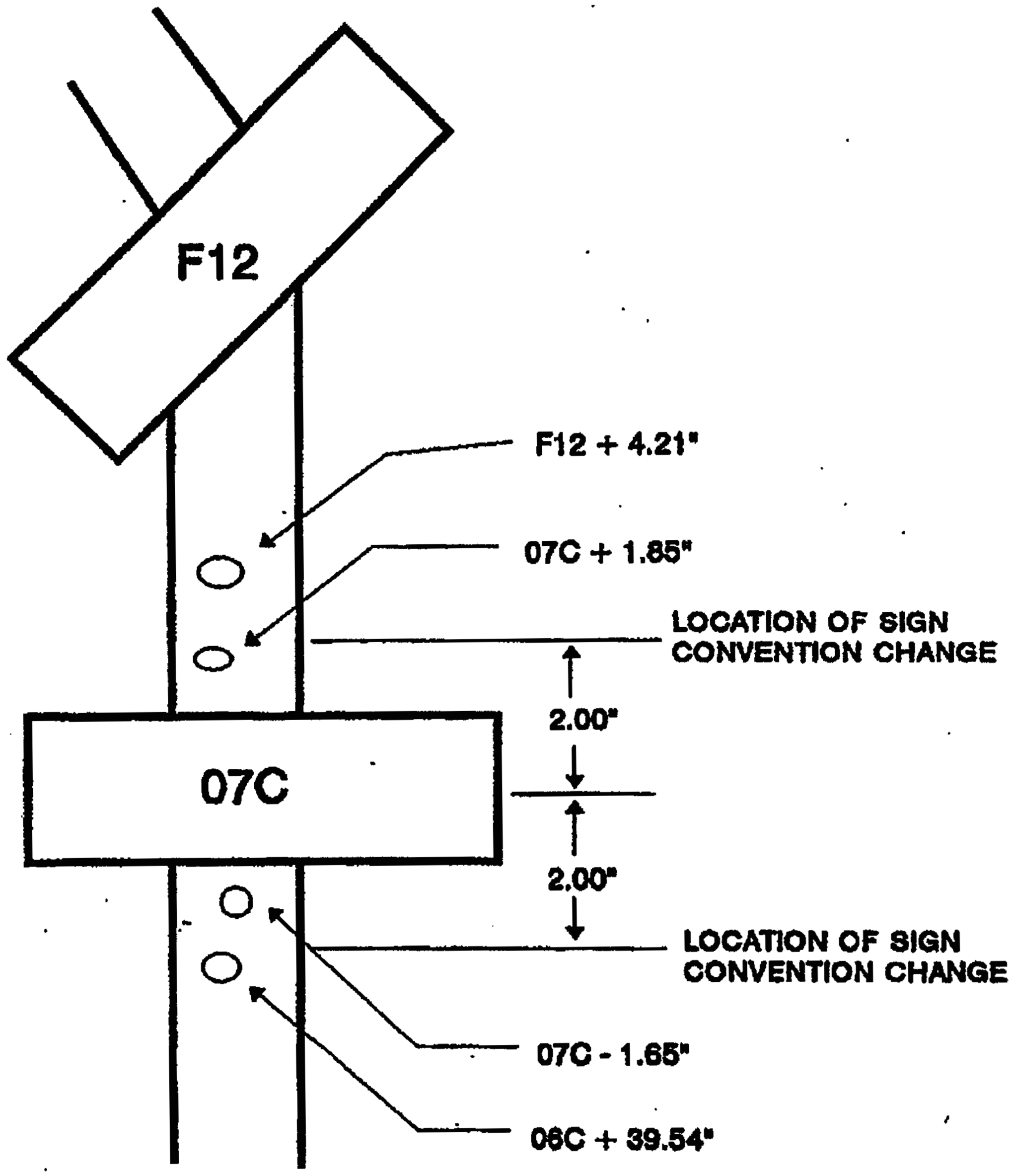
b. A tubesheet minus measurement (i.e., TSH -5.50) may be reported in cases where no tube end was recorded.

9.6.18 The positive direction for reporting indication locations is in the direction from lattice grids, fan bars, tubesheet and tube ends toward the top cold leg support (07C). **The sign convention changes at the tube location 2.00 inches above the centerline of tube support 07C.** The convention for reporting flaw locations is shown in Figure 5-1, with specific examples shown in Figure 9-2.

9.6.19 A six character Test Extent shall be reported. Test Extent shall be reported as actual begin test (3-letter location) and actual end test (3-letter location). In the case of only one intersection being tested, the begin and the end test will be that intersection (i.e., 07H07H).

9.6.20 Extent tested for a restricted tube (RRT) shall be reported as the furthest complete support structure, tubesheet, or tube end. A message from the data collector is needed to call an RRT.

Figure 9-2
Illustration of Flaw Locations



Attachment 1
Appendix B

MILLSTONE POWER STATION UNIT 2
DNG/DNT INDICATIONS, STEAM GENERATOR 2

Millstone Power Station Unit 2
Dominion Nuclear Connecticut, Inc. (DNC)

MILLSTONE POWER STATION UNIT 2
DENT AND DING INDICATIONS, STEAM GENERATOR 2

Dent/Ding	Trending Information
Tube 1-10 Location 04C+32.29	First reported in the pre-installation baseline examination, this cold leg indication has changed from 22.48 Volts to 12.35 Volts along with the call channel changing from a process channel, (mix of two frequencies), to a single prime frequency differential channel. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6.*" During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 1-116 Location 04H+32.30	First reported in the pre-installation baseline examination, this hot leg indication has only varied from 6.35 Volts to 5.29 Volts despite the call channel changing from a process channel, (mix of two frequencies), to a single prime frequency differential channel. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6.*" During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear. RPC tested R11 and R15 with no degradation found (NDF).

Dent/Ding	Trending Information
Tube 1-116 Location 03H+34.77	First reported in the pre-installation baseline examination, this indication has only varied from 8.55 Volts to 6.76 Volts despite the call channel changing from a process channel, (mix of two frequencies), to a single prime frequency differential channel. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6*." During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear. RPC tested R11 and R15 with no degradation found (NDF).
Tube 4-61 Location F01+11.64	This small U-bend ding (7.04 Volts) was first detected in mid-cycle inspection (i.e., 1997) with a voltage of 11.50. Possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 23-4 Location F05 –1.19	First reported in the pre-installation baseline examination, this U-bend indication has only varied from 3.36 Volts to 3.5 Volts. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6*." During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.

Dent/Ding	Trending Information
Tube 24-3 Location F05 –1.63	First reported in the pre-installation baseline examination, this U-bend indication has only varied from 4.18 Volts to 3.48 Volts. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6.*" During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 50-79 Location 04H+31.30	This small hot leg ding (4.59 Volts) was first detected in 2R13 (i.e., fall 2000) with a voltage of 4.83. RPC was performed of this indication in both outages. There was no detectable degradation found (NDF). RPC tested R13 with no degradation found. RPC tested R15 with no degradation found.
Tube 54-33 Location 07H-0.17	This small hot leg ding (3.89 Volts) was first detected in 2R13 (i.e., fall 2000) with a voltage of 4.03. RPC was performed of this indication in both outages. There was no detectable degradation found (NDF). RPC tested R13 with no degradation found. RPC tested R15 with no degradation found.
Tube 61-56 Location F03-1.60	First reported in the pre-installation baseline examination, this U-bend indication has varied from 16.87 Volts to 9.11 Volts despite the call channel changing from a process channel, (mix of two frequencies), to a single prime frequency differential channel. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6.*" During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.

Dent/Ding	Trending Information
Tube 61-62 Location F01 +2.37	First reported in the pre-installation baseline examination, this U-bend indication has varied from 7.61 Volts to 6.11 Volts despite the call channel changing from a process channel, (mix of two frequencies), to a single prime frequency differential channel. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6*." During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 67-44 Location TSH +13.84	First reported in the pre-installation baseline examination, this hot leg indication has varied from 22.46 Volts to 17.38 Volts. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6*." During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to); distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear. RPC tested four times (i.e., 1991, 1997, 2000, and 2003) with no degradation found.
Tube 69-38 Location 02C+0.97	This small cold leg ding (3.02 Volts) was first detected in a mid-cycle inspection (i.e., 1997) with a voltage of 4.4. During R13 it was not reportable with a voltage of 1.97 volts. These voltage changes are most likely related to the distance between the inspection coil and the tube wall (i.e., probe diameter differences, diametrical offset of the probe within the tube, and probe wear).
Tube 72-109 Location F09+0.47	This small cold leg dent (1.82 Volts) is below the reporting/recording.

Dent/Ding	Trending Information
Tube 88-79 Location F05+0.94	This small U-bend ding (3.26 Volts) was first reported in 2R15. The most probable reason for the change is related to the distance between the inspection coil and the tube wall (i.e., probe diameter differences, diametrical offset of the probe within the tube, and probe wear).
Tube 92-79 Location 04C +33.56	This small cold leg ding (4.02 Volts) was first detected in 2R13 (i.e., 2000) with a voltage of 3.69. This indication was not identified during the baseline inspection (with the steam generators in the horizontal position). However, the indication was present the first time this tube was tested with the steam generator installed vertically. The voltage amplitude changes potentially are the result of calibration changes, distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 94-115 Location 01C+11.30	This small cold leg ding (7.9 Volts) was first detected in 2R13 (i.e., 2000) with a voltage of 7.20. This indication was not identified during the baseline inspection (with the steam generators in the horizontal position). The indication was present the first time this tube was tested with the steam generator installed vertically. The voltage amplitude changes potentially are the result of calibration changes, distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Location 01C+11.83	This small cold leg ding (4.02 Volts) was first detected in 2R13 (i.e., 2000) with a voltage of 3.25. This indication was not identified during the baseline inspection (with the steam generators in the horizontal position). The indication was present the first time this tube was tested with the steam generator installed vertically. The voltage amplitude changes potentially are the result of calibration changes, distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.

Dent/Ding	Trending Information
Tube 95-66 Location 07C+1.41	First reported in the baseline examination this cold leg indication has varied from 6.06 Volts to 3.31 Volts. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6.*" During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to): distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 95-104 Location 07C+1.72	This small cold leg ding (4.40 Volts) was first detected in 2R13 (i.e., 2000) with a voltage of 4.44. This indication was not identified during the baseline inspection (with the steam generators in the horizontal position). The indication was present the first time this tube was tested with the steam generator installed vertically. The voltage amplitude changes potentially are the result of calibration changes, distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.
Tube 97-68 Location TSC +0.84	This small cold leg ding (3.58 Volts) was first detected in 2R15. The most probable reasons for the change are related to the distance between the inspection coil and the tube wall (i.e., probe diameter differences, diametrical offset of the probe within the tube, and probe wear). RPC tested R15 with no degradation found.
Tube 103-48 Location F06+4.58	This small U-bend ding (3.69 Volts) was first detected in 2R13 (i.e., 2000) with a voltage of 3.48. This indication was not identified during the baseline inspection (with the steam generators in the horizontal position). However, the indication was present the first time this tube was tested with the steam generator installed vertically. The voltage amplitude changes potentially are the result of calibration changes, distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.

Dent/Ding	Trending Information
Tube 121-94 Location 07C+1.55	First reported in the pre-installation baseline examination this cold leg indication has varied from 5.95 Volts to 3.14 Volts. The current procedure methodology for establishing calibration sensitivity is consistent with the industry guidelines, (4x20% flat-bottom holes equal to four volts peak-to-peak), as described in the EPRI Technical Report, "*Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 6*." During the baseline examination, calibration sensitivities were established by setting the 4x100% through-wall holes equal to six volts peak-to-peak. Other possible explanations for the amplitude changes include (but are not limited to): distance changes between the inspection coils and tube wall due to probe diameter differences, diametrical offset of the probe within the tube, and probe wear.