



Northeast
Utilities System

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Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(203) 665-5000

May 23, 1994

Docket No. 50-423
B14855

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

Millstone Nuclear Power Station, Unit No. 3
Relief Request from ASME Code Section XI Requirements

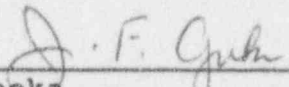
The purpose of this letter is to request, consistent with the intent of NRC Generic Letter (GL) 90-05, relief from ASME Boiler and Pressure Vessel Code Section XI requirements pursuant to 10CFR50.55a(g)(6)(i). Attachment 1 provides a description of actions taken by the Northeast Nuclear Energy Company (NNECO) to repair a pinhole leak in the service water system piping line 3SWP-030-344-3 as an alternative to an IWA-4000/7000 repair/replacement. Specifically, the leak is located at 12 o'clock on a 3/4" test connection approximately 1 1/2" from the 30" header connection on the B train of the component coolant water heat exchanger service water return piping.

Consistent with the provisions of GL 90-05, NNECO is submitting this relief request for a temporary noncode repair prior to performing a code repair. A code repair is planned for the next outage exceeding 30 days but no later than the next refueling outage expected to begin in May, 1995. The Resident Inspector at Millstone Unit No. 3 has been informed of this course of action and, as has been our practice, we will keep the Resident Inspector fully informed of all future repairs and/or activities.

Please contact us if you have any questions.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY



J. F. Opeka
Executive Vice President

cc: T. T. Martin, Region I Administrator
V. L. Rooney, NRC Project Manager, Millstone Unit No. 3
P. D. Swetland, Senior Resident Inspector, Millstone Unit
Nos. 1, 2, and 3

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Docket No. 50-423
B14855

Attachment 1

Millstone Nuclear Power Station, Unit No. 3

Relief Request from ASME Code Section XI Requirements

May 1994

NORTHEAST UTILITIES

TRACKING FORM

FOR RELIEF REQUEST FROM ASME SECTION XI REQUIREMENTS

MUST BE COMPLETED AND FILED WITH NRC WITHIN 30 CALENDAR DAYS

UNIT: MILLSTONE UNIT 3

NCR# 394-041

DATE: 4/22/94

TIME: 12:50

1.0 ORIGINATOR

Processing Time: should not exceed 24 hours.

1.1 COMPLETE SECTION 1 OF ENCLOSED FORM

Complete

1.2 NOTIFY RESIDENT NRC INSPECTOR

Person Contacted: Ken Kolaczyk

Date: 4/22/94

1.3 FORWARD THIS FORM, NCR AND NDE MEASUREMENTS TO NUSCO SUPERVISOR, STRESS ANALYSIS ENGINEERING SECTION

Originator: Gary Swider

Date: 4/22/94

#####

2.0 STRESS ANALYSIS SECTION

Date Received: 4/22/94

Processing Time: 72 hours from flaw detection for preliminary operability assessment.

25 calendar days from flaw detection for final operability assessment.

2.1 PRELIMINARY FLAW EVALUATION

Evaluation Completed By: Ray E. DeConto
Memo MP3-DE-94-077

Date: 4/22/94

Notify Plant

Person Contacted : Gary Swider

Date: 4/22/94

NORTHEAST UTILITIES

TRACKING FORM

FOR RELIEF REQUEST FROM ASME SECTION XI REQUIREMENTS

2.2 END OF CYCLE FLAW EVALUATION

Evaluation Completed By: Mary Lou Urick Date: 5/16/94

2.3 REVIEW RESULTS OF AUGMENTED INSPECTION

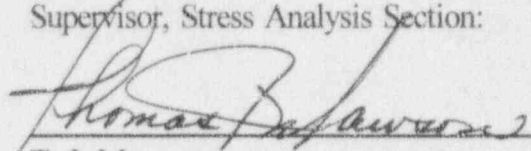
Completed By: Mary Lou Urick Date: 5/16/94

If additional inspections are required, notify plant.

No additional inspections are required.

2.4 FORWARD COMPLETED FORM TO NUCLEAR LICENSING

Supervisor, Stress Analysis Section:


T. J. Mawson

Date : 5/16/94

#####

3.0 NUCLEAR LICENSING

Processing Time: should not exceed 30 calendar days from flaw detection.

3.1 RELIEF REQUEST SUBMITTED

By: P.G. Patton

Date: 5 / 23 /94

Docket No. 50-423

NORTHEAST UTILITIES

FORM FOR RELIEF REQUEST FROM ASME SECTION XI REQUIREMENTS

UNIT: Millstone Unit 3

NCR # 394-041

DATE: 4/22/94

TIME: 12:50

1.0 ORIGINATOR

1.1 DESCRIPTION OF FLAW

Pinhole located at 12 o'clock on 3/4" test connection approximately 1 1/2" from 30" header connection on B train of component cooling piping heat exchanger return piping. Leak is drawing air into pipe due to location of flaw downstream of discharge restrictive orifice to discharge tunnel.

Piping/Component Drawing No.: CI-SWP-95

PI&D No.: EM-133B

1.2 IMPRACTICALITY OF PERMANENT REPAIR

Unisolable

1.3 DESCRIPTION OF PROPOSED TEMPORARY REPAIR

Installation of soft rubber patch weighing less than 1/2 lb.

1.4 SAFETY SIGNIFICANCE: System Interaction Evaluation

Flooding: Pinhole leak, floor drains adequate

Jet Spray: Leak spray would not affect safety-related power supplies

Loss of Flow: Temporary patch will prevent loss of flow

Other Interactions: None

Failure Consequences? If leakage not contained, loss of one train of service water.

Impact to Safe Shutdown Capability? Total failure would result in loss of one train of service water to reactor plant component cooling water, charging and motor control center/rod control area conditioning coolers, redundant train would enable safe shutdown.

1.5 ROOT CAUSE INVESTIGATION

Root Cause Description: Leak occurred in area of cavitation downstream of a restrictive orifice. Wall loss occurred in solid 90/10 Cu-Ni due to turbulence.

Other Systems Affected: None

NORTHEAST UTILITIES

FORM FOR RELIEF REQUEST FROM ASME SECTION XI REQUIREMENTS

1.6 AUGMENTED INSPECTION (must be completed within 15 days of flaw detection)

Assessment of overall degradation of the affected system: Leak is similar in size (pinhole) as other leaks which have occurred in service water piping. The wall loss is very localized and the augmented inspections show it is unique.

Additional examinations required (based on root cause) - specify number of inspection locations - also specify frequency of inspections: [ten most accessible locations for high energy piping and five for moderate energy piping systems]

Five additional locations were chosen, as listed below:

- a) Line No. 3-SWP-030-97-3, downstream of FW-15; A train return,
Dwg. No. CI-SWP-97
- b) Line No. 3-SWP-030-97-3, downstream of FW-17; A train return,
Dwg. No. CI-SWP-97
- c) Line No. 3-SWP-030-335-3, downstream of FW-19; A train return,
Dwg. No. CI-SWP-97
- d) Line No. 3-SWP-026-273-3, downstream of FW-23; A train return,
Dwg. No. CI-SWP-27
- e) Line No. 3-SWP-026-79-3, downstream of FW-26; B train return,
Dwg. No. CI-SWP-28

Description of areas selected for augmented inspection: Small bore piping of similar configuration.

2.0 STRESS ANALYSIS UNIT

2.1 DESIGN DETAILS

System: Service Water

Component: Free end branch, downstream of FW-16 on line no. 3-SWP-030-344-3

Piping Size & Schedule: 3/4"/.157"

Nominal Wall Thickness: .157"

Safety Code Class: Class 3

Material: SB 466 No. 706

Design Pressure: 100 psi

Design/Operating Temperature: 95

Code Minimum Wall Thickness: .006

NORTHEAST UTILITIES

FORM FOR RELIEF REQUEST FROM ASME SECTION XI REQUIREMENTS

2.2 FLAW CHARACTERIZATION

Flaw Description/Size: (i.e., flaw size, adjacent wall thickness, single/multiple flaw, total area examined, etc.) The flaw is highly localized. The through wall portion of the flaw is 1/16" diameter and the adjacent wall/nominal wall is .157".

Flaw Location: The flaw is in a free end branch downstream of FW-16

Method of Examination: UT

Flaw Type: Pinhole due to turbulence

Referenced UT Measurement Report: Attached to NCR 394-041

2.3 PRELIMINARY FLAW EVALUATION SUMMARY

Preliminary Operability Assessment Details:

Method Used: Draft Code Case N513 (dated 8/13/92)

Limiting Flaw Size: Total flaw 1.05". Through wall portion of flaw 0.525"/minimum average wall thickness outside of the flaw must be at least 0.020 inches.

Period of Time to Reach Limiting Flaw Size: Approximately 4 years.

Evaluation Reference: Memo MP3-DE-94-077

2.4 END OF CYCLE FLAW EVALUATION SUMMARY

Final Operability assessment Details:

Method Used: Draft Code Case N513 (dated 8/13/92)

Estimated Erosion Rate: .018"/yr

Projected Flaw Size: Total projected flaw size is .375", total projected through wall portion is 0.313".

Period of Time to Permanent Repair/Replacement: Permanent repair for this flaw is scheduled before the end of the next refueling outage (scheduled to begin on 05/27/95 or sooner)

NORTHEAST UTILITIES

FORM FOR RELIEF REQUEST FROM ASME SECTION XI REQUIREMENTS

2.4 END OF CYCLE FLAW EVALUATION SUMMARY (cont'd)

Provide a Discussion of Evaluation of Design Loading Conditions:

Loading conditions evaluated include: Pressure, deadload, thermal, and seismic. All Code stress equations were considered and were determined to be acceptable.

Evaluation Reference: Memo MP3-DE-94-096

Discussion of Augmented Inspection Results:

Five additional inspections of susceptible components were performed. These five inspections did not result in the generation of any additional NCRs.

2.5 FLAW MONITORING

Walkdown Frequency: (for leak monitoring)

At least once per shift.

Frequency of Follow-up NDE: (for erosion rate assessment)

At least once every three months.

2.6 ADDITIONAL COMMENTS (scope, limitations, and specific considerations)

None

2.7 EXCEPTIONS TO GL 90-05 / DRAFT ASME CODE CASE

The evaluations were performed in accordance with GL 90-05 and the Draft Code Case N513 (dated 8/13/92)

2.8 REFERENCES / INPUTS

NCR 394-041

Memos MP3-E-93-426

Memos MP3-DE-94-077 and 096

cc: **Originator, Supervisor, Stress Analysis Engineering Section, Department Director, Nuclear Records**

PART 1 3/4" Free End Off of 3SWP-030-344-3

Objective: The objective of this evaluation is to qualify a pin hole leak in a 3/4" free end branch off of line 3SWP-030-344-3 as described in NCR 394-041 for structural integrity. This evaluation qualifies the piping through the end of the next scheduled refueling outage.

Parameters: The following parameters will be applied in this evaluation (Reference 1):

Pipe Size Nominal	Outside Dia. (in)	Schedule	Wall thick (in)	Design Pressure (psi)	Temp (F)	Material	Allowable Sh (psi)
3/4	1.050	nonstd	0.157	100	95	SB466 706	8700

1.0 SCOPE

This evaluation is applicable to:

- Class 3 Section III Subsection ND piping
- Operating conditions <200F, < 275 psig
- Pipe, tube, fittings and flanges - NO WELDING
- Structural integrity only. This does not demonstrate system operability.
- t-adj is used throughout this calculation. t-adj is always the predicted t-adj.

3.0 FLAW EVALUATION

This evaluation is applicable to non-planar (through wall holes) and is performed in accordance with Generic Letter 90-05 and DRAFT Code Case N513 (8/13/92) (Reference 3).

3.1 t_{min} and t-adj Determination

- Determine t_m per construction code (Reference 2).

$$t_m = P * D_o / (2 * (S E + P y)) + A$$

P= pressure, psig

D_o= outside diameter, in

S= stress allowable, psi

E= joint efficiency = 1.00

y= a coefficient = 0.4

A= additional thickness (corrosion allowance, threading, etc...)
= 0 for this analysis

Outside Dia. (in)	t _m (in)	t _{meas} minimum (in)	Instrument + Calibrate Tolerance (in)	(Ref. 6) Years of Service (yrs)	Wear Rate (in/yr)	Remaining Life Required (yrs)	t _{adj} (1) (in)
1.050	0.0060	0.1	0.003	8.77	0.0179	1.299	0.0737

Note 1) The t-adj value is the predicted remaining wall at the end of the next scheduled refueling outage (05/27/95 to 08/10/95).

Note 2) The component considered in this evaluation has been inservice since July 15, 1985.

Note 3) The measured data is per Reference 5.

PART 1 continued

3.2 Branch reinforcement Evaluation Method (Reference 2)

a) t_{adj} must be greater than $2 \cdot t_m$

Pipe Size Nominal	t_{adj}	$2 \cdot t_m$
3/4	0.0737	0.0120

acceptable

b) The postulated circular diameter, d , shall not exceed the pipe nominal outside diameter.

Pipe Size Nominal	d Outside Dia. (in)	Maximum Allow Flaw Length (in)	Predicted Total Flaw Circ Length (in)	Predicted flaw is set equal to 0.375 inches.
3/4	1.050	1.050	0.38	OK

The following branch connection reinforcement calculation is performed in accordance with ND 3643.3 (Reference 2).

Required reinforcement area = $1.07 \cdot t_m \cdot h \cdot d_1$

A_1 = area provided by excess wall in the pipe = $d_2 \cdot (T_h - t_m)$

The mill tolerance on T_h is ignored since UT is available.

Note: d_2 has been set equal to the maximum allowable hole size.

Pipe Size Nominal	t_m (in)	d_1 (in)	d_2 (in)	t_{adj}	Required Reinforce Area, in ²	Excess Pipe Area A_1 , in ²
3/4	0.0060	1.05	1.05	0.0737	0.007	0.071

OK

c) Determination of unreinforced branch connection stresses per ND 3650

Pipe Size Nominal	t_{adj}	R_{adj}	h	t_{adj} SIF	SIF Per Figure NC3672.9	t_{nom} SLP (psi)	t_{adj} SLP (psi)
3/4	0.074	0.49	0.151	3.173	2.1	167	356

Pipe Size Nominal	t_{adj}	R_{adj}	t_{nom} Section Modulus (in ³)	t_{adj} Section Modulus (in ³)
3/4	0.074	0.49	0.086	0.052

PART 1 continued

The following table presents both the t_{nom} & t_{adj} corrected Code stress equations:

Equation	Point Number	t_{nom} Stress (psi)	t_{adj} Stress (psi)	Allowable Stress (psi)	t_{adj} Factor of Safety	
8 Sustained	A	275	628	8700	13.85	OK
9 Norm/Up Occasional	A	360	842	10440	12.39	OK
10 Thermal	A	1	3	13050	5171.43	OK
11 Sus + Th	A	276	631	21750	34.50	OK
9 Faulted Occasional	A	395	931	20880	22.43	OK

- d) An additional limitation is placed on the through wall portion of the maximum hole size. The through wall portion of the crack may not exceed $d/2$ or 5 inches.

t_m	0.006 in
Additional Predicted Wall Thinning	0.023 in
Minimum Wall Required To Prevent Expansion of the Through Wall Flaw	0.029 in

Measured Through Wall Portion of Flaw	1/16 in	
Maximum Allowed Through Wall Portion of Flaw (lesser of $d/2$ or 5 inches)	0.525 in	
Predicted Through Wall Portion of Flaw (1)	0.313 in	OK

Note: 1) This value includes a .25 inch tolerance.

PART 2 3/4" Free End Off of 3SWP-030-334-3

Objective: The objective of this evaluation is to determine the minimum wall which will still meet all Code equations. This is an iterative process where the final tadj selected results in just meeting the limiting Code equation. An estimate of remaining life is also determined here.

Parameters:

Pipe Size Nominal	Outside Dia. (in)	Schedule	Wall thick (in)	Design Pressure (psi)	Temp (F)	Material	Allowable Sh (psi)
3/4	1.050	nonstd	0.157	100	95	SB466 706	8700

1.0 SCOPE

This evaluation is applicable to:

- Class 3 Section III Subsection ND piping
- Operating conditions <200F, < 275 psig
- Pipe, tube, fittings and flanges - NO WELDING
- Structural integrity only. This does not demonstrate system operability.
- t-adj is used throughout this calculation. t-adj is always the predicted t-adj.

3.0 FLAW EVALUATION

This evaluation is applicable to non-planar (through wall holes) and is performed in accordance with Generic Letter 90-05 and DRAFT Code Case N513 (8/13/92).

3.1 tmin and t-adj Determination

- Determine tm per construction code.

$$t_m = P * D_o / (2 * (SE + P_y) + A$$

P = pressure, psig

Dc = outside diameter, in

S = stress allowable, psi

E = joint efficiency = 1.00

y = a coefficient = 0.4

A = additional thickness (corrosion allowance, threading, etc...)
= 0 for this analysis

Outside Dia. (in)	tm (in)	tmeas minimum (in)	Instrument + Calibrate Tolerance (in)	(Ref. 6) Years of Service (yrs)	Wear Rate (in/yr)	Remaining Life Required (yrs)	tadj (1) (in)
1.050	0.0060	0.1	0.003	8.77	0.0179	1.299	0.0130
Instrument + Calibration Tolerance (in)							0.003
Estimated minimum wall required (in)							0.016
USE							0.02
Remaning Life (yrs)							4.469
USE							4

Note 1) The t-adj value identified in this column is an assumed wall thickness. This value yields a Code equation stress which is just within the Code allowable for the limiting Code equation.

PART 2 continued

3.2 Branch reinforcement Evaluation Method (Reference 2)

a) t_{adj} must be greater than $2 \cdot t_m$

Pipe Size Nominal	t_{adj}	$2 \cdot t_m$
3/4	0.0130	0.0120

 acceptable

b) The postulated circular diameter, d , shall not exceed the pipe nominal outside diameter.

Pipe Size Nominal	d Outside Dia. (in)	Maximum Allow Flaw Length (in)	Predicted Total Flaw Circ Length (in)	Predicted flaw is set equal to 0.375 inches.
3/4	1.050	1.050	0.38	OK

The following branch connection reinforcement calculation is performed in accordance with ND 3643.3 (Reference 2).

Required reinforcement area = $1.07 \cdot t_m \cdot d_1$

A_1 = area provided by excess wall in the pipe = $d_2 \cdot (T_h - t_m)$

The mill tolerance on T_h is ignored since UT is available.

Note: d_2 has been set equal to the maximum allowable hole size.

Pipe Size Nominal	t_m (in)	d_1 (in)	d_2 (in)	t_{adj}	Required Reinforce Area, in ²	Excess Pipe Area A_1 , in ²
3/4	0.0060	1.05	1.05	0.0130	0.007	0.007

 OK

c) Determination of unreinforced branch connection stresses per ND 3650

Pipe Size Nominal	t_{adj}	R_{madj}	h	t_{adj} SIF	SIF Per Figure NC3672.9	t_{nom} SLP (psi)	t_{adj} SLP (psi)
3/4	0.0130	0.52	0.025	10.506	2.1	167	2019

Pipe Size Nominal	t_{adj}	R_{madj}	t_{nom} Section Modulus (in ³)	t_{adj} Section Modulus (in ³)
3/4	0.013	0.52	0.086	0.011

PART 2 continued

The following table presents both the tnom & t-adj corrected Code stress equations:

Equation	Point Number	tnom Stress (psi)	t-adj Stress (psi)	Allowable Stress (psi)	t-adj Factor of Safety	
8 Sustained	A	275	6307	8700	1.38	OK
9 Norm/Up Occasional	A	360	9687	10440	1.08	OK
10 Thermal	A	1	40	13050	328.14	OK
11 Sus + Th	A	276	6346	21750	3.43	OK
9 Faulted Occasional	A	395	11079	20880	1.88	OK

- d) An additional limitation is placed on the through wall portion of the maximum hole size. The through wall portion of the crack may not exceed d/2 or 5 inches.

tm	0.006 in
Additional Predicted Wall Thinning	0.080 in
Minimum Wall Required To Prevent Expansion of the Through Wall Flaw	0.086 in

Measured Through Wall Portion of Flaw	1/16 in
Maximum Allowed Through Wall Portion of Flaw (lesser of d/2 or 5 inches)	0.525 in
Predicted Through Wall Portion of Flaw (1)	0.313 in

OK

Note: 1) This value includes a .25 inch tolerance.

- References: 1) S&W Stress Calculation 12179-NP(B)-X1902, Revision 4 (Job 9063, dtd 8/20/91)
 2) ASME Section III 1971 Edition through the 1973 Summer Addenda
 3) ASME Draft Code Case N513 (8/13/92) and GL 90-05
 4) NCR 394-041
 5) Attached UT data
 6) Memo MP3-E-93-426 G. Swider, to: R. DeConto, dated June 14, 1993

Computer Storage: disk:\sw41\41-94.wk3

Prepared By: Mary Louise Grick
 M. Grick

Date: 5/16/94

Reviewed By: Stan V. Dumas
 S. V. Dumas

Date: 5/16/94

SUBJECT Evaluation of Stress Values for 3/4" Free End Off of Line
 No. 3-SWP-030-344-3

BY M. Urlick DATE May 16, 1994
 CHKD. BY *MD* DATE 5-16-94
 CALC. NO. REV.
 SHEET NO. 1 OF 2

Evaluation of Stress Values for 3/4" Free End Off of Line No. 3-SWP-030-344-3

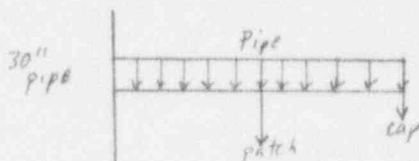
- References
- 1) ITT Grinnell, "Pipe Hanger Design and Engineering", revised 1979.
 - 2) Flag Flow Catalog FF-70
 - 3) Omar W. Blodgett, Design of Welded Structures, The James F. Lincoln Arc Welding Foundation, Cleveland, OH, copyright 1966
 - 4) Stress Calculation No. 12179-NP(B)-X1902, Revision 4 including CCN #1
 - 5) NCR 394-041

Background

A 3/4" free end pipe is located off of node 34 of the Reference 4 pipe stress calculation. The 3/4" free end piping will not experience the same stress as the 30" piping it is attached. The stress values for the free end are calculated below to more accurately represent the stress.

Evaluation

The piping is 3/4", .157" thick Cu-Ni pipe that is approximately 6" long. To calculate the deadweight moment on the pipe -- moment taken at end of pipe.



Pipe weight (reference 1) = $F \times 10.68 \times t \times (D - t)$ where: $F = 1.14$ for cu-ni
 = $1.14 \times 10.68 \times .157 \times (1.05 - .157)$ $t = .157$ in.
 = 1.71 lb/ft $D = 1.05$ in.

Contents (reference 1) = $G \times .3405 \times (D - 2t)^2$ $G = 1.026$
 = $1.026 \times .3405 \times (1.05 - 2(.157))^2$
 = .19 lb/ft

Total = 1.90 lb/ft

Cap weight (reference 2) = .24 lbs.

Patch weight (reference 5) = .5 lbs.

The pipe can be modeled as a cantilevered beam.

Deadweight Moment = $w_{cap} \times l + w_{patch} \times \frac{1}{2}l + \frac{1}{2}wl^2$
 = $.24 \text{ lb.} \times 6" + .5 \text{ lb.} \times 3" + \frac{1}{2} \times 1.90 \text{ lb/ft} \times (6 \text{ in.})^2 / 12 \text{ in/ft}$
 = 5.79 in-lb.

SUBJECT Evaluation of Stress Values for 3/4" Free End Off of Line
No. 3-SWP-030-344-3

BY M. Urlick DATE May 16, 1994
 CHKD. BY MD DATE 5-16-94
 CALC. NO. REV.
 SHEET NO. 2 OF 2

$$\begin{aligned} \text{Pressure stress} &= PD/(4t_{\text{nom}}) & P &= 100 \text{ psi.} & t_{\text{nom}} &= .157" \\ &= 100 \text{ psi.} \times 1.05 \text{ in.} / (4 \times .157) \\ &= 167.2 \text{ psi.} \end{aligned}$$

$$\begin{aligned} \text{Equation 8 stress} &= \frac{.75 i M_A}{z} + \frac{PD}{4t_{\text{nom}}} & i &= 2.1 & z &= .0853 \text{ in}^3 \text{ (conservative} \\ & & & & & \text{for } 3/4", .154" \text{ thick} \\ & & & & & \text{pipe)} \\ &= .75(2.1)(5.79)/.0853 + 167.2 = 106.9 + 167.2 \\ &= 274.1 \text{ psi.} \\ \text{Use} &= 275 \text{ psi} \end{aligned}$$

From the Reference 4 calculation, the maximum OBE and SSE acceleration for the span between nodes 33 and 40 are:

	N-S(g)	Vertical(g)
OBE	.346	.672
SSE	.531	.966

Note: E-W direction is axial therefore negligible impact on bending stress.

The resultant stress due to OBE is:

$$S_{R0} = \sqrt{(.346 \times 106.9)^2 + (.672 \times 106.9)^2} = 80.8 \text{ psi}$$

$$\begin{aligned} \text{Equation 9 Stress} &= \frac{.75 i M_R}{z} + \frac{.75 i M_A}{z} + \frac{PD}{4t_{\text{nom}}} = S_{R0} + \frac{.75 i M_A}{z} + \frac{PD}{4t_{\text{nom}}} \\ &= 80.8 + 106.9 + 167.2 \\ &= 354.9 \text{ psi.} \\ \text{Use} &= 360 \text{ psi} \end{aligned}$$

As this is a short (6") rigid piece of pipe, a dynamic load factor (DLF) of unity was used.

As this is a free end pipe thermal stress is negligible. Use 1 psi for Equation 10 stress.

Equation 11 stress will be 276 psi, 275 psi (sustained) + 1 psi (thermal).

For faulted conditions, the resultant stress due to SSE is:

$$S_{Rs} = \sqrt{(.531 \times 106.9)^2 + (.966 \times 106.9)^2} = 117.8 \text{ psi}$$

$$\begin{aligned} \text{Equation 9 Stress(Faulted)} &= \frac{.75 i M_{RF}}{z} + \frac{.75 i M_A}{z} + \frac{PD}{4t_{\text{nom}}} = S_{Rs} + \frac{.75 i M_A}{z} + \frac{PD}{4t_{\text{nom}}} \\ &= 117.8 + 106.9 + 167.2 \\ &= 391.9 \text{ psi.} \\ \text{Use} &= 395 \text{ psi} \end{aligned} \quad \begin{aligned} & \text{(Again used DLF=1.0)} \end{aligned}$$

EROSION/CORROSION ULTRASONIC CALIBRATION DATA SHEET

SYSTEM
S. W

COMPONENT DESCRIPTION CI-SWP 95 SW. 1
HORIZONTAL STRAIGHT (STUB)

COMPONENT IDENTIFICATION
FW 16 D.S.

EXAMINATION PURPOSE

INITIAL ☒ REINSPECTION ☐ BASELINE ☐ MAP ☐ VERIFICATION ☐

AWO NUMBER

M3-94-07626

EXAMINATION TYPE

GRID INTERSECTS ☒ SCAN BETWEEN GRIDS ☒ SCAN ONLY ☐

PHOTO

DISK

N/A FRAME N/A

LINE NUMBER

3-SWP-030-344-3

DIAMETER

3/4"

T_{nom}

.157"

.875 of T_{nom}

.137"

GRID MATRIX
PARAMETER

COMP. I.D.

N/A

COMP. I.D.

FW 16 D.S.

COMP. I.D.

N/A

COMP. I.D.

N/A

COMP. I.D.

N/A

GRID
SIZE

1/2"

A1 - G7

EXT. 1

N/A

MAIN
SECTION

A1 - G7

EXT. 2

N/A

EXT. 3

N/A

BRANCH

N/A

COMPONENT TEMPERATURE

>125°F ☒ No ☐ Yes TEMP: N/A°F

SURFACE PAINTED ☐

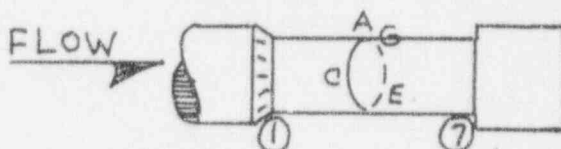
UNPAINTED ☒

AVG. COATING THICKNESS: N/A

X 3mil = N/A mil (COATING FACTOR)

COMMENTS/SKETCH

OTHER READINGS AT GRID
POINTS BELOW T-SCRN.
WERE LOCALIZED.



LOW SCAN READING OF .068". NO CALIBRATION STANDARD BELOW .100" AVAILABLE.

INSTRUMENT TOLERANCE .001"

CALIBRATION TOLERANCE .002"

INSTRUMENT STRESSTEL

MFG/MODEL#: T-SCOPE SN: CL 734

CAL STANDARD(S) SN: N/A

SN: 93-5712

MATL: CU NI

TRANSDUCER

MFG. STRESSTEL SN: A2650

SIZE: .250"

FREQUENCY: 5MHz

TYPE: DUAL

COUPLANT BATCH # 092101

MRIR# 492-205-1

CAL. STANDARD THICKNESS		INSTRUMENT READING		CALIBRATION CHECKS	
MIN.	MAX.	MIN.	MAX.		
.100"	.300"	.099"	.300"	Initial Cal.	1530
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
.100"	.300"	.099"	.301"	Final Cal.	1550

GRID AND DATA VERIFIED AS CORRECT

EXAMINER: Tom M. M... LEVEL: II L

DATE: 4-22-94

REVIEWER: Gray J. L... LEVEL: N/A

DATE: 4-22-94

EROSION/CORROSION ULTRASONIC
MANUAL/MAPPING/SKETCH SHEET

SYSTEM J. W.

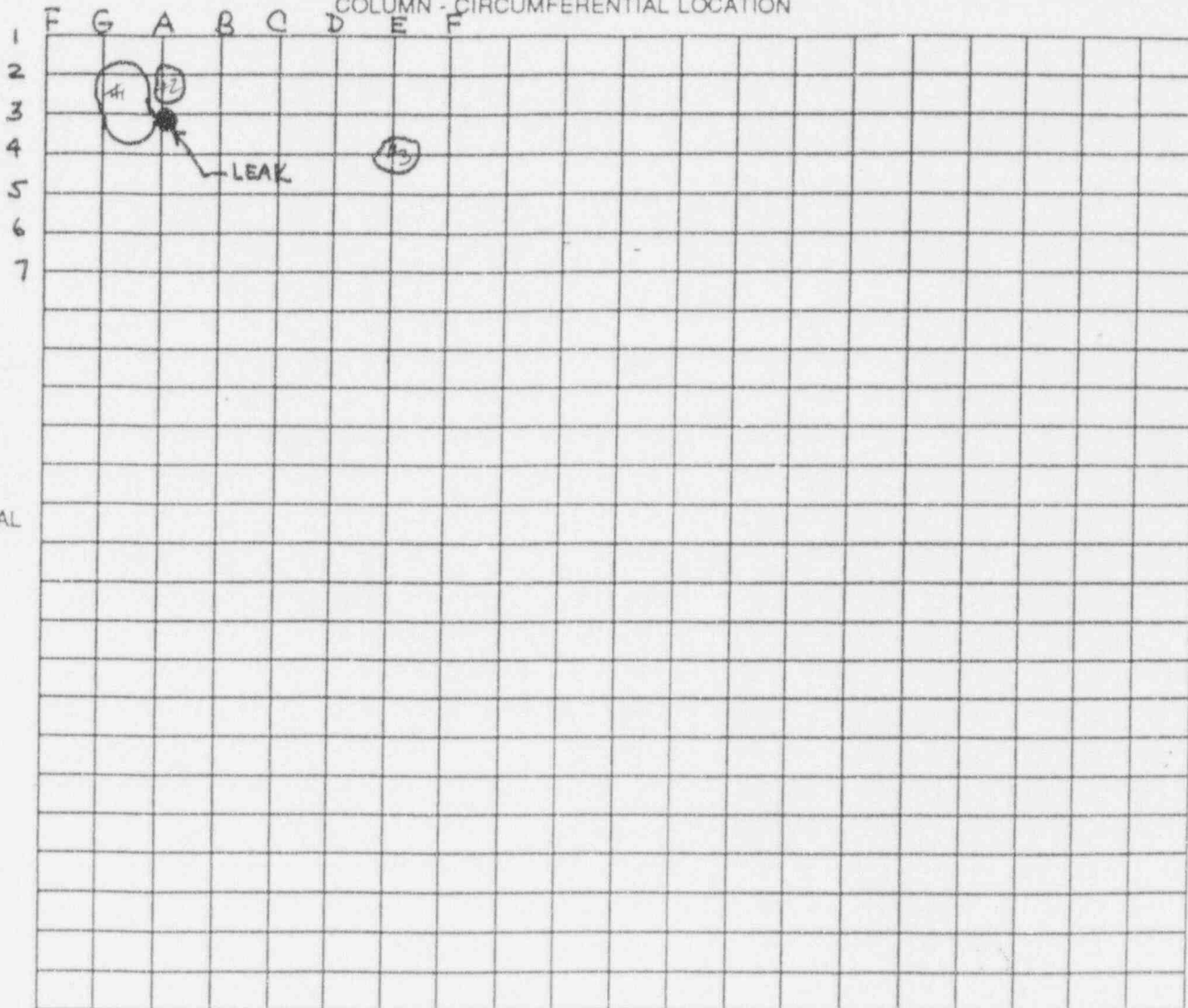
COMPONENT DESCRIPTION
HORIZONTAL STRAIGHT (STUB)

COMPONENT IDENTIFICATION
FW 16 D.S.

SEE ATTACHMENT 1:
EROSION/CORROSION ULTRASONIC CALIBRATION DATA SHEET

AWO NUMBER
M3-94-07626

COLUMN - CIRCUMFERENTIAL LOCATION



EXAMINER [Signature]
REVIEWER [Signature]

LEVEL II L
LEVEL FLA

DATE 4-22-94
DATE 4-22-94

LOW SCAN READING IN AREA #1 .068"
" " " " " #2 .089"
" " " " " #3 .112"

● DENOTES APPROXIMATE LOCATION
OF LEAK.

Path: C:\DMIII
File: FW16DS .DAT

775 .a.. 4-22-94 4:35:24 pm

Page 1

FILE NAME: FW16DS
DOS FILE NAME: FW16DS.DAT
FILE TYPE: GRID
DATE & TIME CREATED: 04/22/94 15:14
DATE & TIME LAST MODIFIED: 04/22/94 15:43
FILE DESCRIPTION: HORZ.STRT.
ALLOW MANUAL READINGS: Y
UPPER LEFT LOCATION: A1
LOWER RIGHT LOCATION: G7
OPERATOR ID: J.MATYAS
INSTRUMENT ID: CL734
PROBE ID: A2650
MATERIAL VELOCITY:
INCHES OR MM: I

READINGS

0.155 0.162 0.144 0.153 0.151 0.147 0.140
0.125 0.158 0.156 0.152 0.151 0.146 0.129
0.138 0.165 0.156 0.153 0.151 0.133 0.100
0.134 0.160 0.160 0.136 0.121 0.147 0.137
0.143 0.159 0.155 0.149 0.150 0.148 0.118
0.158 0.159 0.155 0.151 0.148 0.145 0.149
0.159 0.159 0.156 0.167 0.149 0.145 0.149

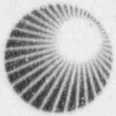
Main Section (0)

Rows : 7 Cols : 7 Direction : Clockwise Offset : 0

	A	B	C	D	E	F	G	RowMx	RowMn	Delta	Ave
1	0.155	0.162	0.144	0.153	0.151	0.147	0.140	0.162	0.140	0.022	0.150
2	0.125	0.158	0.156	0.152	0.151	0.146	0.129	0.158	0.125	0.033	0.145
3	0.138	0.165	0.156	0.153	0.151	0.133	0.100	0.165	0.100	0.065	0.142
4	0.134	0.160	0.160	0.136	0.121	0.147	0.137	0.160	0.121	0.039	0.142
5	0.143	0.159	0.155	0.149	0.150	0.148	0.118	0.159	0.118	0.041	0.146
6	0.158	0.159	0.155	0.151	0.148	0.145	0.149	0.159	0.145	0.014	0.152
7	0.159	0.159	0.156	0.167	0.149	0.145	0.149	0.167	0.145	0.022	0.155
ColMx	0.159	0.165	0.160	0.167	0.151	0.148	0.149				
ColMn	0.125	0.158	0.144	0.136	0.121	0.133	0.100				
Delta	0.034	0.007	0.016	0.031	0.030	0.015	0.049				
Ave	0.145	0.160	0.155	0.152	0.146	0.144	0.132				

Section Summary

Maximum Reading = 0.167 (7, D) Average = 0.148
 Minimum Reading = 0.100 (3, G) Standard Deviation = 0.013
 Total Readings = 49



Northeast
Utilities System

Memo

May 16, 1994
MP3-TS-94-385

To: Steve Dumas
Unit 3 - Design and Engineering

Gary Swider

From: Gary Swider
Unit 3 - Tech Support

Subject: Accuracy of UT Measurement Systems Used for NCR 394-041

The ultrasonic thickness measurements on the following Service Water piping as referenced on NCR 394-041 were taken using a Stresstel T-Scope (S/N CL 734) with a Stress-Tel 5 mhz probe. The inspection had an accuracy of 0.002" over the entire range inspected. Calibration sheets documenting the above accuracy and calibration have been attached to the NCR.

If you have any questions, please contact me at extension 5381.

cc: D. R. MacNeill
NCR 393-041
P. J. Parulis *PJP*
File

Augmented Inspection Points

EROSION/CORROSION ULTRASONIC CALIBRATION D. SHEET

SYSTEM <u>SW</u>	COMPONENT DESCRIPTION <u>HOR STRT PIPE</u>	COMPONENT IDENTIFICATION <u>SWP 27 FW23</u>
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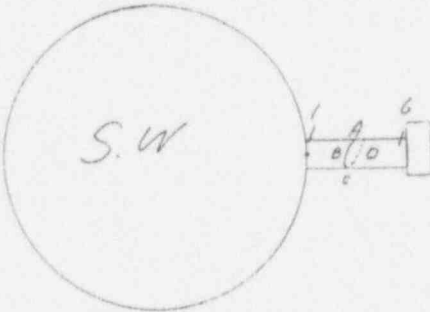
EXAMINATION PURPOSE INITIAL <input checked="" type="checkbox"/> REINSPECTION <input type="checkbox"/> BASELINE <input type="checkbox"/> MAP <input type="checkbox"/> VERIFICATION <input type="checkbox"/>	AWO NUMBER <u>173-94-07933</u>
---	-----------------------------------

EXAMINATION TYPE GRID INTERSECTS <input checked="" type="checkbox"/> SCAN BETWEEN GRIDS <input checked="" type="checkbox"/> SCAN ONLY <input type="checkbox"/>	PHOTO DISK <u>N.A</u> FRAME <u>N.A</u>
---	---

LINE NUMBER <u>SWP 27</u>	DIAMETER <u>1"</u>	T _{nom} <u>.114"</u>	.875 of T _{nom} <u>.10"</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	GRID SIZE <u>1"</u>
GRID MATRIX PARAMETER <u>A1-D6</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>FW23</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	GRID SIZE <u>1"</u>
EXT. 1 <u>N.A</u>	MAIN SECTION <u>A1-D6</u>	EXT. 2 <u>N.A</u>	EXT. 3 <u>N.A</u>	EXT. 3 <u>N.A</u>	BRANCH <u>N.A</u>	GRID SIZE <u>1"</u>

COMPONENT TEMPERATURE >125°F <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes TEMP: <u>N.A</u> °F	SURFACE PAINTED <input type="checkbox"/> UNPAINTED <input checked="" type="checkbox"/>	AVG. COATING THICKNESS: <u>N.A</u> X 3mil = <u>N.A</u> mil (COATING FACTOR)
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COMMENTS/SKETCH



LOOKING NORTH

LOWEST READING .110"

INSTRUMENT TOLERANCE <u>.001</u>	CALIBRATION TOLERANCE <u>.001</u>
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INSTRUMENT <u>STRESSTEC</u> MFG/MODEL# <u>T-SCOPE</u> SN: <u>CL736</u>	CAL STANDARD(S) SN: <u>N.A</u> SN: <u>93-5708</u> MATL: <u>CUNI</u>
---	--

TRANSDUCER MFG. <u>STRESSTEC</u> SN: <u>A2646</u>	SIZE: <u>.250</u>	FREQUENCY: <u>5 MHz</u>	TYPE: <u>PULC</u>
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COUPLANT BATCH # <u>092101</u>	MRIR# <u>492-205-1</u>
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CAL. STANDARD THICKNESS		INSTRUMENT READING		CALIBRATION CHECKS	
MIN.	MAX.	MIN.	MAX.		
<u>.100"</u>	<u>.300"</u>	<u>.101"</u>	<u>.300"</u>	Initial Cal.	<u>0835</u>
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
<u>.100"</u>	<u>.300"</u>	<u>.101"</u>	<u>.300"</u>	Final Cal.	<u>0845</u>

GRID AND DATA VERIFIED AS CORRECT			
EXAMINER: <u>J. Matthews</u>	LEVEL: <u>I</u>	DATE: <u>5-11-94</u>	
REVIEWER: <u>2RM</u>	LEVEL: <u> </u>	DATE: <u>5-11-94</u>	

Main Section (0)

Rows : 6 Cols : 4 Direction : Clockwise Offset : 0

	A	B	C	D	RowMx	RowMn	Delta	Ave
1	0.113	0.119	0.120	0.113	0.120	0.113	0.007	0.116
2	0.117	0.121	0.120	0.112	0.121	0.112	0.009	0.118
3	0.116	0.119	0.119	0.112	0.119	0.112	0.007	0.117
4	0.110	0.116	0.118	0.118	0.118	0.110	0.008	0.116
5	0.113	0.121	0.115	0.111	0.121	0.111	0.010	0.115
6	0.114	0.121	0.126	0.120	0.126	0.114	0.012	0.120
ColMx	0.117	0.121	0.126	0.120				
ColMn	0.110	0.116	0.115	0.111				
Delta	0.007	0.005	0.011	0.009				
Ave	0.114	0.120	0.120	0.114				

Section Summary

Maximum Reading = 0.126 (6, C) Average = 0.117
 Minimum Reading = 0.110 (4, A) Standard Deviation = 0.004
 Total Readings = 24

EROSION/CORROSION ULTRASONIC CALIBRATION DATA SHEET

SYSTEM <u>SW</u>	COMPONENT DESCRIPTION <u>HOR STRT PIPE</u>	COMPONENT IDENTIFICATION <u>SWP 28 FW26</u>
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EXAMINATION PURPOSE INITIAL <input checked="" type="checkbox"/> REINSPECTION <input type="checkbox"/> BASELINE <input type="checkbox"/> MAP <input type="checkbox"/> VERIFICATION <input type="checkbox"/>	AWO NUMBER <u>M3-94-07932</u>
---	----------------------------------

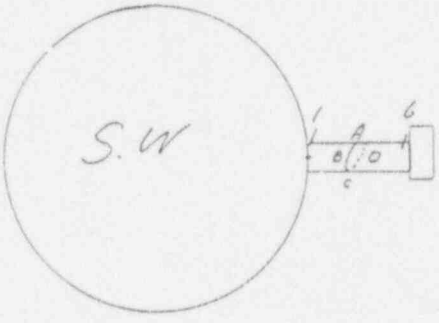
EXAMINATION TYPE GRID INTERSECTS <input checked="" type="checkbox"/> SCAN BETWEEN GRIDS <input checked="" type="checkbox"/> SCAN ONLY <input type="checkbox"/>	PHOTO DISK <u>N.A</u> FRAME <u>N.A</u>
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LINE NUMBER <u>SWP 28</u>	DIAMETER <u>1"</u>	T _{nom} <u>.114"</u>	.875 of T _{nom} <u>.110"</u>
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GRID MATRIX PARAMETER <u>A1-D6</u>	COMP. I.D. <u>N.A</u> EXT. 1 <u>N.A</u>	COMP. I.D. <u>FW26</u> MAIN SECTION <u>A1-D6</u>	COMP. I.D. <u>N.A</u> EXT. 2 <u>N.A</u>	COMP. I.D. <u>N.A</u> EXT. 3 <u>N.A</u>	COMP. I.D. <u>N.A</u> BRANCH <u>N.A</u>	GRID SIZE <u>1"</u>
--	--	--	--	--	--	-------------------------------

COMPONENT TEMPERATURE >125°F <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes TEMP: <u>N.A</u> °F	SURFACE PAINTED <input type="checkbox"/> UNPAINTED <input checked="" type="checkbox"/>	AVG. COATING THICKNESS: <u>N.A</u> X 3mil = <u>N.A</u> mil (COATING FACTOR)
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COMMENTS/SKETCH



LOOKING NORTH LOWEST READING .109"

INSTRUMENT TOLERANCE <u>.001</u>	CALIBRATION TOLERANCE <u>.002"</u>
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INSTRUMENT <u>STRESSTEC</u> MFG/MODEL: <u>T-SCOPE</u> SN: <u>CL736</u>	CAL STANDARD(S) SN: <u>N.A</u> SN: <u>93-5708</u> MATL: <u>CUNI</u>
---	--

TRANSDUCER MFG. <u>STRESSTEC</u> SN: <u>A2646</u>	SIZE: <u>.250</u>	FREQUENCY: <u>5 MHz</u>	TYPE: <u>DUAL</u>
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COUPLANT BATCH # <u>092101</u>	MRIR# <u>492-205-1</u>
--------------------------------	------------------------

CAL. STANDARD THICKNESS		INSTRUMENT READING		CALIBRATION CHECKS	
MIN.	MAX.	MIN.	MAX.		
<u>.100"</u>	<u>.300"</u>	<u>.101"</u>	<u>.300"</u>	Initial Cal.	<u>0855</u>
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
<u>.100"</u>	<u>.300"</u>	<u>.102"</u>	<u>.301"</u>	Final Cal.	<u>0905</u>

GRID AND DATA VERIFIED AS CORRECT			
EXAMINER: <u>D. Wacker</u>	LEVEL: <u>I</u>	DATE: <u>5-11-94</u>	
REVIEWER: <u>SW</u>	LEVEL:	DATE: <u>6-11-94</u>	

Main Section (0)

Rows : 6 Cols : 4 Direction : Clockwise Offset : 0

	A	B	C	D	RowMx	RowMn	Delta	Ave
1	0.132	0.118	0.122	0.116	0.132	0.116	0.016	0.122
2	0.120	0.117	0.111	0.122	0.122	0.111	0.011	0.118
3	0.122	0.119	0.119	0.117	0.122	0.117	0.005	0.119
4	0.124	0.119	0.114	0.115	0.124	0.114	0.010	0.118
5	0.121	0.116	0.117	0.114	0.121	0.114	0.007	0.117
6	0.120	0.115	0.109	0.117	0.120	0.109	0.011	0.115
ColMx	0.132	0.119	0.122	0.122				
ColMn	0.120	0.115	0.109	0.114				
Delta	0.012	0.004	0.013	0.008				
Ave	0.123	0.117	0.115	0.117				

Section Summary

Maximum Reading = 0.132 (1, A) Average = 0.118
 Minimum Reading = 0.109 (6, C) Standard Deviation = 0.005
 Total Readings = 24

EROSION/CORROSION ULTRASONIC CALIBRATION DATA SHEET

SYSTEM <u>S.W</u>	COMPONENT DESCRIPTION <u>STRT PIPE</u>	COMPONENT IDENTIFICATION <u>FW15</u>
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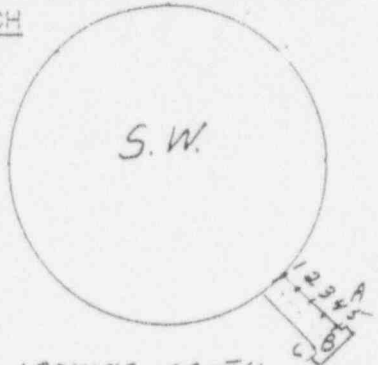
EXAMINATION PURPOSE INITIAL <input checked="" type="checkbox"/> REINSPECTION <input type="checkbox"/> BASELINE <input type="checkbox"/> MAP <input type="checkbox"/> VERIFICATION <input type="checkbox"/>	AWO NUMBER <u>M3-94-07933</u>
---	----------------------------------

EXAMINATION TYPE GRID INTERSECTS <input checked="" type="checkbox"/> SCAN BETWEEN GRIDS <input checked="" type="checkbox"/> SCAN ONLY <input type="checkbox"/>	PHOTO DISK <u>N.A</u> FRAME <u>N.A</u>
---	--

LINE NUMBER <u>SWP 97</u>	DIAMETER 1" <u>1.250"</u>	T _{nom} .126" <u>.114"</u>	.875 of T _{nom} <u>.110"</u>			
GRID MATRIX PARAMETER <u>A1-05</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	GRID SIZE <u>1"</u>
	EXT. 1 <u>N.A</u>	MAIN SECTION <u>A1-05</u>	EXT. 2 <u>N.A</u>	EXT. 3 <u>N.A</u>	BRANCH <u>N.A</u>	

COMPONENT TEMPERATURE >125°F <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes TEMP: <u> </u> °F	SURFACE PAINTED <input type="checkbox"/> UNPAINTED <input checked="" type="checkbox"/>	AVG. COATING THICKNESS: <u>N.A</u> X 3mil = <u>N.A</u> mil (COATING FACTOR)
--	---	--

COMMENTS/SKETCH



LOOKING SOUTH LOWEST READING .123" AT B2

INSTRUMENT TOLERANCE <u>.001"</u>	CALIBRATION TOLERANCE <u>.001"</u>
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INSTRUMENT <u>STRESSTEC</u> MFG/MODEL#: <u>T-SCOPE</u> SN: <u>CL 736</u>	CAL STANDARD(S) SN: <u>N.A</u> SN: <u>93-5708</u> MATL: <u>CUNI</u>
---	--

TRANSDUCER MFG. <u>STRESSTEC</u> SN: <u>A-2646</u>	SIZE: <u>250"</u>	FREQUENCY: <u>5 MHz</u>	TYPE: <u>QUAD</u>
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COUPLANT BATCH # <u>092101</u>	MRIR# <u>492-205-1</u>
--------------------------------	------------------------

CAL. STANDARD THICKNESS		INSTRUMENT READING		CALIBRATION CHECKS	
MIN.	MAX.	MIN.	MAX.		
.100"	.300"	.101"	.300"	Initial Cal.	1010
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
.100"	.300"	.101"	.301"	Final Cal.	1020

GRID AND DATA VERIFIED AS CORRECT	
EXAMINER: <u>J. Matthews</u> LEVEL: <u>I</u>	DATE: <u>5-5-94</u>
REVIEWER: <u> </u> LEVEL: <u> </u>	DATE: <u>5-9-94</u>

Main Section (0)

Rows : 5 Cols : 4 Direction : Clockwise Offset : 0

	A	B	C	D	RowMx	RowMn	Delta	Ave
1	0.134	0.126	0.128	0.131	0.134	0.126	0.008	0.130
2	0.124	0.123	0.130	0.128	0.130	0.123	0.007	0.126
3	0.125	0.125	0.129	0.128	0.129	0.125	0.004	0.127
4	0.131	0.126	0.129	0.129	0.131	0.126	0.005	0.129
5	0.130	0.129	0.134	0.133	0.134	0.129	0.005	0.132
ColMx	0.134	0.129	0.134	0.133				
ColMn	0.124	0.123	0.128	0.128				
Delta	0.010	0.006	0.006	0.005				
Ave	0.129	0.126	0.130	0.130				

Section Summary

Maximum Reading = 0.134 (1, A) Average = 0.129
 Minimum Reading = 0.123 (2, B) Standard Deviation = 0.003
 Total Readings = 20

EROSION/CORROSION ULTRASONIC CALIBRATION DATA SHEET

SYSTEM <u>S.W</u>	COMPONENT DESCRIPTION <u>STRT PIPE</u>	COMPONENT IDENTIFICATION <u>FW17</u>
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EXAMINATION PURPOSE INITIAL <input checked="" type="checkbox"/> REINSPECTION <input type="checkbox"/> BASELINE <input type="checkbox"/> MAP <input type="checkbox"/> VERIFICATION <input type="checkbox"/>	AWO NUMBER <u>193-94-07933</u>
---	-----------------------------------

EXAMINATION TYPE GRID INTERSECTS <input checked="" type="checkbox"/> SCAN BETWEEN GRIDS <input checked="" type="checkbox"/> SCAN ONLY <input type="checkbox"/>	PHOTO DISK <u>N.A</u> FRAME <u>N.A</u>
---	--

LINE NUMBER <u>SWP 97</u>	DIAMETER <u>1250</u> ^{STRAIGHT}	T _{nom} <u>126</u> ^{615 5/16}	.875 of T _{nom} <u>1100</u> ^{615 5/16}
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GRID MATRIX PARAMETER <u>A1-D5</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	COMP. I.D. <u>N.A</u>	GRID SIZE <u>1"</u>
	EXT. 1 <u>N.A</u>	MAIN SECTION <u>A1-D5</u>	EXT. 2 <u>N.A</u>	EXT. 3 <u>N.A</u>	BRANCH <u>N.A</u>	

COMPONENT TEMPERATURE >125°F <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes TEMP: <u> </u> °F	SURFACE PAINTED <input type="checkbox"/> UNPAINTED <input checked="" type="checkbox"/>	AVG. COATING THICKNESS: <u>N.A</u> X 3mil = <u>N.A</u> mil (COATING FACTOR)
--	---	--

COMMENTS/SKETCH

LOOKING SOUTH

LOWEST READING .125" AT B4

INSTRUMENT TOLERANCE <u>±.001"</u>	CALIBRATION TOLERANCE <u>.001"</u>
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INSTRUMENT <u>STRESSTEL</u> MFG/MODEL#: <u>T-SCOPE</u> SN: <u>CL 736</u>	CAL STANDARD(S) SN: <u>N.A</u> SN: <u>93-5210</u> MATL: <u>CUNI</u>
---	--

TRANSDUCER MFG. <u>STRESSTEL</u> SN: <u>A-2646</u> SIZE: <u>250"</u> FREQUENCY: <u>5 MHz</u> TYPE: <u>QUAL</u>

COUPLANT BATCH # <u>092101</u>	MRIR# <u>492-205-1</u>
--------------------------------	------------------------

CAL. STANDARD THICKNESS		INSTRUMENT READING		CALIBRATION CHECKS	
MIN.	MAX.	MIN.	MAX.		
.100"	.300"	.100"	.300"	Initial Cal.	1025
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
.100"	.300"	.101"	.300"	Final Cal.	1035

GRID AND DATA VERIFIED AS CORRECT
EXAMINER: <u>D. Wadley</u> LEVEL: <u>I</u>
REVIEWER: <u>DM</u> LEVEL: <u> </u>
DATE: <u>5-5-94</u>
DATE: <u>5-7-94</u>

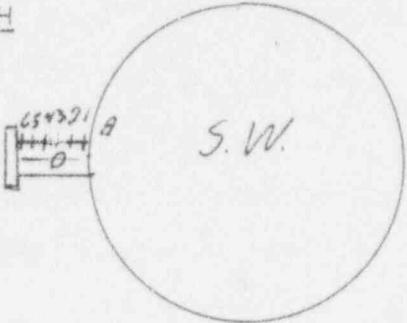
Main Section (0)

Rows : 5 Cols : 4 Direction : Clockwise Offset : 0

	A	B	C	D	RowMx	RowMn	Delta	Ave
1	0.127	0.127	0.131	0.131	0.131	0.127	0.004	0.129
2	0.128	0.126	0.128	0.125	0.128	0.125	0.003	0.127
3	0.127	0.127	0.126	0.128	0.128	0.126	0.002	0.127
4	0.129	0.125	0.128	0.129	0.129	0.125	0.004	0.128
5	0.131	0.127	0.136	0.129	0.136	0.127	0.009	0.131
ColMx	0.131	0.127	0.136	0.131				
ColMn	0.127	0.125	0.126	0.125				
Delta	0.004	0.002	0.010	0.006				
Ave	0.128	0.126	0.130	0.128				

Section Summary

Maximum Reading = 0.136 (5, C) Average = 0.128
 Minimum Reading = 0.125 (2, B) Standard Deviation = 0.003
 Total Readings = 20

SYSTEM <u>SW</u>		COMPONENT DESCRIPTION <u>STRT PIPE</u>		COMPONENT IDENTIFICATION <u>FW19</u>	
EXAMINATION PURPOSE INITIAL <input checked="" type="checkbox"/> REINSPECTION <input type="checkbox"/> BASELINE <input type="checkbox"/> MAP <input type="checkbox"/> VERIFICATION <input type="checkbox"/>					AWO NUMBER <u>M3-94-07933</u>
EXAMINATION TYPE GRID INTERSECTS <input checked="" type="checkbox"/> SCAN BETWEEN GRIDS <input checked="" type="checkbox"/> SCAN ONLY <input type="checkbox"/>				PHOTO DISK <u>N.A.</u>	FRAME <u>N.A.</u>
LINE NUMBER <u>SWP 97</u>	DIAMETER <u>3/4"</u>	T _{nom} <u>.114"</u>	.875 of T _{nom} <u>100"</u>		
GRID MATRIX PARAMETER	COMP. I.D. <u>N.A.</u>	COMP. I.D. <u>FW19</u>	COMP. I.D. <u>N.A.</u>	COMP. I.D. <u>N.A.</u>	COMP. I.D. <u>N.A.</u>
	EXT. 1 <u>N.A.</u>	MAIN SECTION <u>A1-06</u>	EXT. 2 <u>N.A.</u>	EXT. 3 <u>N.A.</u>	BRANCH <u>N.A.</u>
GRID SIZE <u>1"</u>					
COMPONENT TEMPERATURE >125°F <input checked="" type="checkbox"/> No <input type="checkbox"/> as TEMP: <u>N.A.</u> °F		SURFACE PAINTED <input type="checkbox"/> UNPAINTED <input checked="" type="checkbox"/>		AVG. COATING THICKNESS: <u>N.A.</u> X 3mil = <u>N.A.</u> mil (COATING FACTOR)	
COMMENTS/SKETCH					
					
<u>LOOKING SOUTH</u> <u>LOWEST READING - .107" AT A3</u>					
INSTRUMENT TOLERANCE <u>.001</u>		CALIBRATION TOLERANCE <u>.002"</u>			
INSTRUMENT <u>STRESSTEC</u> MFG/MODEL#: <u>T-SCOPE</u> SN: <u>CL736</u>		CAL STANDARD(S) SN: <u>N.A.</u> SN: <u>93-5708</u> MATL: <u>CUNI</u>			
TRANSDUCER MFG. <u>STRESSTEC</u> SN: <u>A2646</u>		SIZE: <u>.250"</u>	FREQUENCY: <u>5 MHz</u>		TYPE: <u>DEAC</u>
COUPLANT BATCH # <u>092101</u>		MRIR# <u>492-205-1</u>			
CAL. STANDARD THICKNESS		INSTRUMENT READING		CALIBRATION CHECKS	
MIN.	MAX.	MIN.	MAX.		
<u>100"</u>	<u>300"</u>	<u>101"</u>	<u>300"</u>	Initial Cal.	<u>1115</u>
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
				Intermediate Cal.	
<u>100"</u>	<u>300"</u>	<u>102"</u>	<u>301"</u>	Final Cal.	<u>1125</u>
GRID AND DATA VERIFIED AS CORRECT					
EXAMINER: <u>J. Wainwright</u> LEVEL: <u>I</u>		DATE: <u>5-5-94</u>			
REVIEWER: <u>SRM</u> LEVEL:		DATE: <u>5-7-94</u>			

Main Section (0)

Rows : 6 Cols : 4 Direction : Clockwise Offset : 0

	A	B	C	D	RowMx	RowMn	Delta	Ave
1	0.159	0.152	0.151	0.156	0.159	0.151	0.008	0.155
2	0.136	0.153	0.152	0.159	0.159	0.136	0.023	0.150
3	0.107	0.153	0.148	0.158	0.158	0.107	0.051	0.142
4	0.159	0.155	0.153	0.158	0.159	0.153	0.006	0.156
5	0.159	0.156	0.152	0.148	0.159	0.148	0.011	0.154
6	0.159	0.155	0.154	0.157	0.159	0.154	0.005	0.156
ColMx	0.159	0.156	0.154	0.159				
ColMn	0.107	0.152	0.148	0.148				
Delta	0.052	0.004	0.006	0.011				
Ave	0.147	0.154	0.152	0.156				

Section Summary

Maximum Reading = 0.159 (1, A) Average = 0.152
 Minimum Reading = 0.107 (3, A) Standard Deviation = 0.011
 Readings = 24