Docket No. 50-286
IPN-99-056
Attachment II

STRUCTURAL INTEGRITY EVALUATION FOR SERVICE WATER LINE NUMBER 411
(IP3-CALC-SWS-03010 Rev. 0)

NEW YORK POWER AUTHORITY
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286
DPR-64

9905260226 990517
PDR ADOCK 05000286
P PDR

Nuclear Engineering
CALCULATION CONTROL SHEET

CALC. NO. IP3-CALC-SWS-03010 REVISION 0

CALCULATION IS: PRELIMINARY ___ FINAL ✓

	NAME	SIGNATURE	DATE
PREPARER:	L. EPSTEIN		4/19/99
CHECKER:	K. LO		4/19/99
(DESIGN) VERIFIED/NA	K. Lo		4/19/99
APPROVED:	Richard Drake		4/19/99

ORIGINATOR: NYPA ☒ OR OTHER ☐

SYSTEM NO. /NAME F44-0151 / SERVICE WATER

TITLE: Service water; Line 411; WALL THINNING EVALUATION.

QA CATEGORY: I DISCIPLINE: STRUCTURAL STRUCTURE: —

MODIFICATION NO./TASK NO. N/A. DBD REF. NO. 310

PROBLEM / OBJECTIVE / METHOD

See SH. 1 OF THIS CALC.

DESIGN BASIS / ASSUMPTION

Evaluation is based on NYPA's Engineering Standard CES-7 and QA Report #99 UT 027

SUMMARY / CONCLUSIONS THE measured thicknesses are acceptable, but must be monitored at interval indicated in the calc. (ACTS # 99-41449)

THIS CALC SUPERSEDES OR VOIDS CALC. NO. N/A.

DISTRIBUTION: C = CONTROLLED I = INFO

NAME	DEPT	LOC	C	I
R. DRAKE	IDEM	IP3-24.		✓

Nuclear Engineering
CALCULATION CONTROL SHEET

COMPONENTS

MAJOR EQUIPMENT	PIPE NO.	VALVE NO.	SUPT. NO.	INST. NO.	PENE. NO.
	# 411				

RELATED DOCUMENTS

DER # 99-00759.
PID # 44545
ACT's # 99-41449

REFERENCES

1. QA Report # 99UT027 (ATTACHM. I TO THIS CALC)
2. UE&C CALCULATION Nº 6604.343-C-SW-005 Rev. 1 (S.W. LINES 407 & 411 ANALYSIS FOR VALVE WEIGHT CHANGE (ATT. II TO THIS CALC.)
3. IP3-CALC-SWS-01596, Rev. 0 page 20; FIG. 7 (ATTACHM. 3)
4. QA Report # 99UT028 (ATTACHM. 4 TO THIS CALC)

RELATED DRAWINGS

9321-F-55163 REV. 8

SECURITY: (Y/N) N

COMPUTER PRINTOUT: (Y/N) N

Verification of:

Document Title: Service Water Line 411 Wall Thinning Evaluation

Document Number: IP3-CALC-SWS-03010 Rev. 0

Subject: Calculation

Modification/Task Number (if applicable): N/A

QA Category: I

Review Require	Discipline	Review Completed (initial of reviewer)
	ELECTRICAL	
	MECHANICAL	
	INSTRUMENT & CONTROL	
X	CIVIL/ STRUCTURAL	K. Lo
	FIRE PROTECTION	
	SIMULATOR	

IDENTIFICATION:

Document Title: (print title) Service Water Line 411 Wall Thinning Evaluation

Doc. Number: IP3-CALC-SWS-03010 Doc. Revision: 0

QA Category: I

DISCIPLINE:

[ ] ELEC [ ] I&C
[ ] MECH [ ] Fire Protection
[X] C/S [ ] Simulator
[ ] Other _____ (specified)

METHOD OF VERIFICATION:

[X] **Design Review** [ ] **Alternate Calculations** [ ] **Qualification Test**

Selected Verifier: Kai Lo/IDEM/2052
(print name \ department \ phone ext.)

#	**Design Verification Questionnaire** All questions shall be explained in the space provided.
1.	Were the inputs correct and incorporated into the design?
Explanation:	Yes. Calculation inputs such as 3/8" original wall thickness, as measured 0.14" wall thickness, 1.5" flaw length,18" pipe O.D., 150 psi pressure, 160 degree F design temperature, A53 Gr B pipe Material, pipe stress from stress output.
2.	Are the physical and functional characteristics of the proposed design within the approved design basis of the system(s) structure(s) or components(s)?
Explanation:	N/A
3.	Does the proposed design incorporate license Commitments?
Explanation:	N/A
4.	Are assumptions necessary to perform the design activity adequately described and reasonable: Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?
Explanation:	Yes. All assumptions are as per original ESM-CES-7.
5.	Are the appropriate quality assurance requirements specified? e.g., safety classification?
Explanation:	Yes. QA cat I.
6.	Are the applicable codes, standards and regulatory requirements including issue and addends properly identified and are their requirements for design met?
Explanation:	Yes. ASME Code case N-480.

#	Design Verification Questionnaire All questions shall be explained in the space provided.
7.	Have applicable construction and operating experience been considered?
Explanation:	N/A
8.	Have the design interface requirements for mechanical, electrical/I&C, and civil/structural engineering been satisfied?
Explanation:	Yes. QA department and QA reports.
9.	Was the appropriate design method used?
Explanation:	Yes. ESM-CES-7.
10.	Is the output reasonable compared to inputs?
Explanation:	N/A. No computer output.
11.	Are the specified parts, equipment and processes properly suited for the fire protection Appendix R, QA, and EQ classifications required for the application?
Explanation:	N/A
12.	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?
Explanation:	N/A
13.	Have personnel requirements and limitations for maintenance, testing, and inspection been satisfied?
Explanation:	N/A
14.	Are accessibility, maintenance, repair, and inservice inspection requirements for the plant including the plant conditions under which these will be performed been considered?
Explanation:	N/A
15.	Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?
Explanation:	N/A

#	Design Verification Questionnaire All questions shall be explained in the space provided.
16.	Has the design properly considered radiation exposure to the public and plant personnel? (ALARA/cobalt reduction)
Explanation:	N/A
17.	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have satisfactorily accomplished?
Explanation:	Yes. Wall thickness must be at least 30% of original nominal pipe thickness; expected future corroded thickness is less than the required minimum thickness; wall thickness must be structurally adequate to with stand expected loading, i.e. pressure, dead weight and seismic.
18.	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?
Explanation:	N/A
19.	Are adequate handling, storage, cleaning and shipping requirements specified?
Explanation:	N/A
20.	Are adequate identification requirements specified?
Explanation:	N/A
21.	Are the conclusions drawn in the Safety Evaluation fully supported by adequate discussion in the test or Safety Evaluation itself?
Explanation:	N/A
22.	Are necessary procedural changes specified, and are responsibilities for such changes clearly delineated?
Explanation:	N/A
23.	Are requirements for record preparation, review, approval, retention, etc., adequately specified?
Explanation:	Yes. See related document section of DCM-2, sheet 2
24.	Have supplemental reviews by other engineering disciplines (seismic, electrical, etc.) been performed on the integrated design package?
Explanation:	N/A
25.	Have the drawings, sketches, calculations, etc., included in the integrated design package been reviewed?
Explanation:	Yes. QA report 99UT027 and 99UT028, 9321-F-55163 Rev. 8.

#	Design Verification Questionnaire All questions shall be explained in the space provided.
26.	Have reviews been performed to identify any effect on the Check Valve Maintenance Program?
Explanation:	N/A
27.	Does the design check valves meet the intents of INPO SOER 86-03?
Explanation:	N/A
28.	Is the plant reference simulator physical and function fidelity affected and it's design change been factored into the cost?
Explanation:	N/A
29.	Are all references listed (including design calculations/analysis) that were used as part of the design review?
Explanation:	Yes. See DCM-2 sheet 2.

REMARKS/COMMENTS:

None

Design Verification Complete: Kai K. Lo 4/19/99
(print name_signature_date)

PROBLEM.

A PIN HOLE leak was discovered on the Service Water line # 411 (18" dia) near the 31 Component Cooling Water Heat Exchanger. The leak is on the weld downstream from SWN-34-1.

The purpose of this calculation is to evaluate the minimum acceptable wall thickness AND FLAW LENGTH MEASURED BY Q. (Reports # 99UT027 and # 99UT028)

Evaluation was performed using CES-7 methodology.

New York Power Authority

JP3 NUCLEAR POWER PLANT

PAGE 2 OF ___

CALCULATION NO JP3-CALC-SWS-03011 REVISION 0

EVALUATION OF PIPE WALL THINNING

Piping System : SERVICE WATER / LINE 411

Description : WALL THINNING EVALUATION / QA REPORT #99UT027 (ATT. I TO THIS CALC)

Prepared By : RE Date : 4/19/99

Checked By : VK Date : 4/19/99

STEP 1 : SCREENING EVALUATION

a. Evaluation of Minimum Predicted Thickness : t_p

- Pipe Wall Nominal Thickness, t_{nom} = 0.375 in.
- Latest Measured Minimum Wall Thickness, t_{meas} = 0.140 in.
- Previous Measured Minimun Wall Thickness, t'_{meas} = 0.422 in.
  (If wall has not measured before, $t'_{meas}=1.125*t_{nom}$)
- TIME Between Two Inspections, = 15 yr.
  (If wall has not measured before,
  TIME = service years of the pipe up to first inspection.)
- Erosion/Corrosion Rate, C

$$C = \frac{t'_{meas} - t_{meas}}{TIME} = \frac{0.422-0.140}{15} = 0.0188 \text{ in/yr}$$

- Years between Latest and Next Inspections, Y = 1.0 yrs.
- $t_p = t_{meas} - C * Y = 0.140 - 0.0188(1.0)$ = 0.121 in.

b. Screening Limits :

- Acceptable Limit = $0.875 * t_{nom}$ = 0.328 in.
- Unacceptable Limit = $0.3 * t_{nom}$ = 0.1125 in.

c. Acceptability of the Thinning Wall:

- [ ] Accept As Is for $t_p \geq 0.875*t_{nom}$
  0.328 > 0.121 > 0.1125
- [X] Step 2 Evaluation Required for $0.875*t_{nom} > t_p \geq 0.3*t_{nom}$
- [ ] Repair or Replacement for $0.3*t_{nom} > t_p$

NYPA ESM CRS-7 EVALUATION FORM (SEPT. 1992)

Note: This Evaluation Form can be used as a part of calculation for pipe thinning evaluation, but the calculation shall follow the requirements of NYPA ESM.

EVALUATION OF PIPE WALL THINNING

Piping System : Service Water / LINE # 411

Description : Wall thinning evaluation

Prepared By : [illegible] Date : 4/19/99

Checked By : [illegible] Date : 4/19/99

STEP 2 : MINIMUM WALL THICKNESS EVALUATION

a. Pipe Parameters:

- Pipe Outside Diameter, D = 18.0 in.
- Design Pressure, P = 150 psi
- Design Temperature, T_d = 160 °F
- Pipe Material = A53 GR B
- Allowable Stress at Design Temperature, S = 15,000 psi
- Longitudinal Weld Effective Coefficient, E = 1.0
- An Additional Thickness for Erosion/Corrosion, A = — in.

b. Pipe Minimum Wall Thickness Required by Hoop Stress :

$$- t^h_{min} = \frac{P*D}{2(S*E+0.4P)} + A = \frac{150 \times 18.0}{2(15{,}000+0.4\times150)} = 0.0896 \text{ in.}$$

c. Pipe Minimum Wall Thickness Required by Axial Stresses : Ref. 2 @ N.P. 253

*
- Axial Stress due to Design Cond. (P+DW), 1688 + 407 S_{Des} = 2,095 psi
- Axial Stress due to Upset Cond. (P+DW+OBE), 1688+407+1043 S_{Ups} = 3,138 psi
- Axial Stress due to Faulted Cond. (P+DW+DBE), 1688+407+(1.5)×1043 S_{Fau} = 3,660 psi

- $t_1 = (S_{Des}/S)*t_{nos}$ = 0.0523 in.
- $t_2 = (S_{Ups}/1.2S)*t_{nos}$ = 0.0654 in.
- $t_3 = (S_{Fau}/1.8S)*t_{nos}$ = 0.051 in.

- t^a_{min} = Largest of (t_1, t_2, t_3) = 0.0654 in.

d. Acceptability based on Minimum Wall Thickness Criteria :

- [X] Accept But Monitor for $t_p \geq t^h_{min}$ & t^a_{min} { 0.121 > 0.0654, 0.121 > 0.0896
- [ ] Step 3 Evaluation Required for $t^h_{min} > t_p \geq t^a_{min}$
- [ ] Repair or Replacement for $t^a_{min} > t_p$

* ALL Stresses used has been taken from Reference 2. (UE&C stress analysis)

EVALUATION OF PIPE WALL THINNING

Piping System : Service water / Line # 411

Description : Wall thinning evaluation

Prepared By : [signature] Date : 4/19/99

Checked By : [signature] Date : 4/19/99

STEP 3 : LOCAL THINNING EVALUATION & ESTIMATEION OF REMAINING SERVICE LIFE

a. Pipe Parameters:

$R = D/2 =$ _____ in., $t_{min} = t^h_{min} =$ _____ in., $\sqrt{R*t_{min}} =$ _____ in.

b. Local Thinning Dimensions : (see Figure 7.2)

$L =$ _____ in., $L_n =$ _____ in., $L_{n(t)} =$ _____ in., $L_{n(a)} =$ _____ in.

$L_{n(a)} / \sqrt{R*t_{min}} =$ _____

c. Acceptable Local Thinning thicknesses:

- Case 1 : Applicable if $L_{n(t)} \leq \sqrt{R*t_{min}}$

t_{aloc}/t_{min} (from curve 1 in Figure 7.3) = _____

$t_1 = (t_{aloc}/t_{min})*t_{min}$ = _____ in.

- Case 2 : Applicable if $L_n \leq 2.65\sqrt{R*t_{min}}$ & $1.13t_{min} \leq t_{nom}$,

$t_{21} = [\frac{1.5\sqrt{R*t_{min}}}{L}(1 - \frac{t_{nom}}{t_{min}}) + 1.]*t_{min}$ = _____ in.

$t_{22} = (0.353\ L_n / \sqrt{R*t_{min}})*t_{min}$ = _____ in.

t_2 = Larger of (t_{12}, t_{22}) = _____ in.

Not Required

- Case 3 :

t_{aloc}/t_{min} (from Curve 2 in Figure 7.3) = _____

$t_3 = (t_{aloc}/t_{min})*t_{min}$ = _____ in.

- Minimum Acceptable Local Thickness

t_{aloc} = Minimum of (t_1, t_2, t_3) = _____ in.

d. Acceptability based on Local Thinning Critwia :

- [ ] Accept But Monitor for $t_p \geq t_{aloc}$
- [ ] Repair or Replacement for $t_p < t_{aloc}$

e. Pipe Wall Remaining Service Life (RSL):

0.121 > 0.0896 ; 0.121 > 0.0654

- t_g = Larger of (t^h_{min}, t^a_{min}) if $t_p \geq t^h_{min}$ & t^a_{min} = 0.0896 in.

$= t_3$ if $t^h_{min} > t_p \geq t^a_{min}$

$\geq 0.3*t_{nom}$

$\frac{0.140 - 0.0896}{0.0188}$

- $RSL = \frac{t_{nom} - t_g}{C}$ (where C= pipe thinning rate) = 2.68 yrs.

MAXIMUM FLAW LENGTH EVALUATION

As per Attachment 3 THE MAXIMUM acceptable THROUGH-WALL Circumferential FLAW for 18 IN LINE based on maximum Axial Stress - 3.66 KSI (DW + P + DBE) IS 2.15 IN.

Since QA recorded actual flaw (Attachment 4) IS 1.5 IN < 2.15 IN IT IS acceptable per Att. 3 criteria.

New York Power Authority — Ultrasonic Examination Report

Report No.: 99UT027
Page 1 of 3

Sys. / Comp. ID: Service Water / SWN - 34 - 1
Exam Item: Line 411 Piping

DWG No. or Sketch: 9321-F-27223
WR/Mod: 99-00044-03
QA Category: Cat 1 ASME XI Class: III Cat: N/A
Procedure: NDEP 9.4-12 (I) Rev.: 1

Component Configuration: CCW Piping
Orientation: 0 Degree
Angle: 0 ° Mode: Longitudinal
Type of Material: Carbon Steel
Size: 18" Std. wall Thickness: 0.375"

Equipment

Instrument: 213110 Krautkramer Branson USL 48 Due: 07/13/99

Vertical Linearity Check

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2	50	45	40	35	30	25	20	15	10	5

(Signal 2 shall equal 50% of signal 1 ± 5% of full scale.)

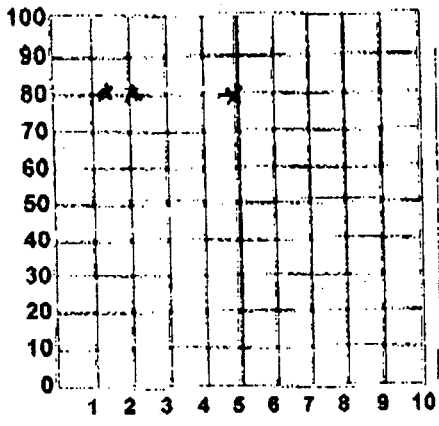
Attenuator Linearity Check

80% - 6 db	80% - 12 db	40% + 6 db	20% + 12 db
40	20	80	80
(32 to 48)	(16 to 24)	(64-96)	(64-96)

Transducer: 0030HD KBA 5 Mhz .25" RND ADP DUAL / GAMMA Wedge: N/A
Search Unit Cable: 6' Self-Cont. Wedge Meas. Angle: 0 ° Exit Point-Front: NA "
Couplant: 97120 Sonotech / Soundsafe Thermometer: QS-18 Due: 8/5/2000 Temperature
Calibration Block: IP3 E/C # 3 Step Wedge T= .15" - .5" Material: Carbon Steel 68 °F
Simulator Block: N/A N/A °F
Reference Block: N/A N/A °F
Entry Surface: OD Component: 70 °F

Distance Amplitude Curve

Each Major Screen Division = 0.1



Reflector	Orient.	% FSH	Pos.	dB
0.151BR	Step	80	1.5	N/A
0.219BR	Step	80	2.1	N/A
0.506BR	Step	80	5.0	N/A

Calibration Times:
2300 2400

Instrument Settings

Range (in.): 0.5"
Sweep Length: 8.06
Sweep Delay: 8.26
Sensitivity (dB): 58
Frequency (mHz): 5
Reject: Off
Filter: NEG
Pulse Length: Fixed
Damping: Min
Mode Select: Dual
Rep. Rate: Fixed
DEC/Gate: On
Jacks: T&R

Acceptance Standard: As per IP3-CAL-SWS-1596
Recordable Indication(s): Yes Recording Level: N/A % DAC Evaluation Level: N/A % DAC
100 % Complete Limitations: Surface painted at most locations, average D.F.T. = 0.009"
Remarks: UT Examination of Line 411 was performed to evaluate wall thinning of 18" dia. pipe Downstream of SWN-34-1. the pipe has leak at grid location "J" discovered by OPs during Walkdown.

Examiner: Siraj H. Memon Level: III Date: 4/19/99
Examiner: N/A Date: 4/19/99
Reviewed by: Level III Date: 4/19/99
ANII Review: Date:

New York Power Authority

Report No.: 99UT027

Page 2 of 3

Sys. / Comp. ID: Service Water / SWN - 34 - 1
Material: Carbon Steel
High Reading: 0.551"
Exam Item: Line 411 piping
Size: 18" Daimeter
Low Reading: 0.058"
DWG No.: 9321-F-27223
Thickness: 0.375" (Nominal)
Grid Size: 1" x 2"
WR / Mod: 99-00044-03
Configuration: CCW Piping
Datum Point: A1 Top of pipe
QA Category: 1
ASME XI Class: III
Cat: N/A
Acceptance Standard: As per IP-3 -CAL-SWS-1596
Procedure: NDEP 9.4-12 (I)
Rev.: 1

UNCORRECTED FOR PAINT D.F.T

No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	.441	.433	.413	.428	.454	.437	.433	.433	.379	.281	.451	.465	.399	.418	.424	.430	.428	.427	.407	.422
2	.511	.492	.498	.516	.493	.535	.552	.537	.530	.112	.185	.161	.140	.523	.531	.498	.520	.551	.530	.479
3	.402	.398	.365	.372	.381	.327	.381	.393	.340	.393	.389	.292	.284	.327	.394	.364	.387	.393	.374	.377
4	.417	.404	.384	.386	.381	.382	.380	.381	.371	.383	.378	.379	.390	.383	.389	.384	.390	.375	.381	.381

No.	U	V	W	X	Y	Z	AA	BB
1	.419	.421	.467	.398	.426	.427	.432	.408
2	.513	.493	.480	.496	.489	.493	.458	.479
3	.391	.388	.364	.382	.393	.390	.392	.398
4	.374	.379	.378	.384	.379	.382	.387	.391

CORRECTED FOR PAINT D.F.T (uncorrected thickness reading - 0.054")

No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	**0.441**	**0.433**	0.359	0.374	0.400	0.383	0.379	0.379	0.325	0.227	0.397	0.411	0.345	0.364	0.370	0.376	0.374	0.373	0.353	0.368
2	**0.511**	**0.492**	**0.498**	**0.516**	**0.493**	**0.535**	**0.552**	**0.537**	**0.530**	0.058	**0.185**	**0.161**	0.140	**0.523**	**0.531**	**0.498**	**0.520**	0.551	**0.530**	**0.479**
3	0.348	0.344	0.311	0.318	0.327	0.273	0.327	0.339	0.286	0.339	0.335	0.238	0.230	0.273	0.340	0.310	0.333	0.339	0.320	0.323
4	0.363	0.350	0.330	0.332	0.327	0.328	0.326	0.327	0.317	0.329	0.324	0.325	0.336	0.329	0.335	0.330	0.336	0.321	0.327	0.327

Used in the CALC

No.	U	V	W	X	Y	Z	AA	BB
1	0.365	0.367	**0.467**	**0.398**	**0.426**	**0.427**	**0.432**	**0.408**
2	**0.513**	**0.493**	**0.480**	**0.496**	**0.489**	**0.493**	**0.458**	**0.479**
3	0.337	0.334	0.310	0.328	0.339	0.336	0.338	0.344
4	0.320	0.325	0.324	0.330	0.325	0.328	0.333	0.337

Remarks:
All thickness readings above are in thousands of an inch.

Data in **BOLD** are at locations of no paint.

Data corrected for paint D.F.T. as per NDEP 9.4-12 I rev. 1, paragraph 8.6.3.1.

Examiner: [signature] Siraj H Memon Level: III Date: 4/19/99

Examiner: N/A Level: Date:

Reviewed by: [signature] Level: Date:

ANII Review: Date:

REA8-98

Attachment I to IP3-CALC-SWS-03010. Rev 0
Page 2 of 3

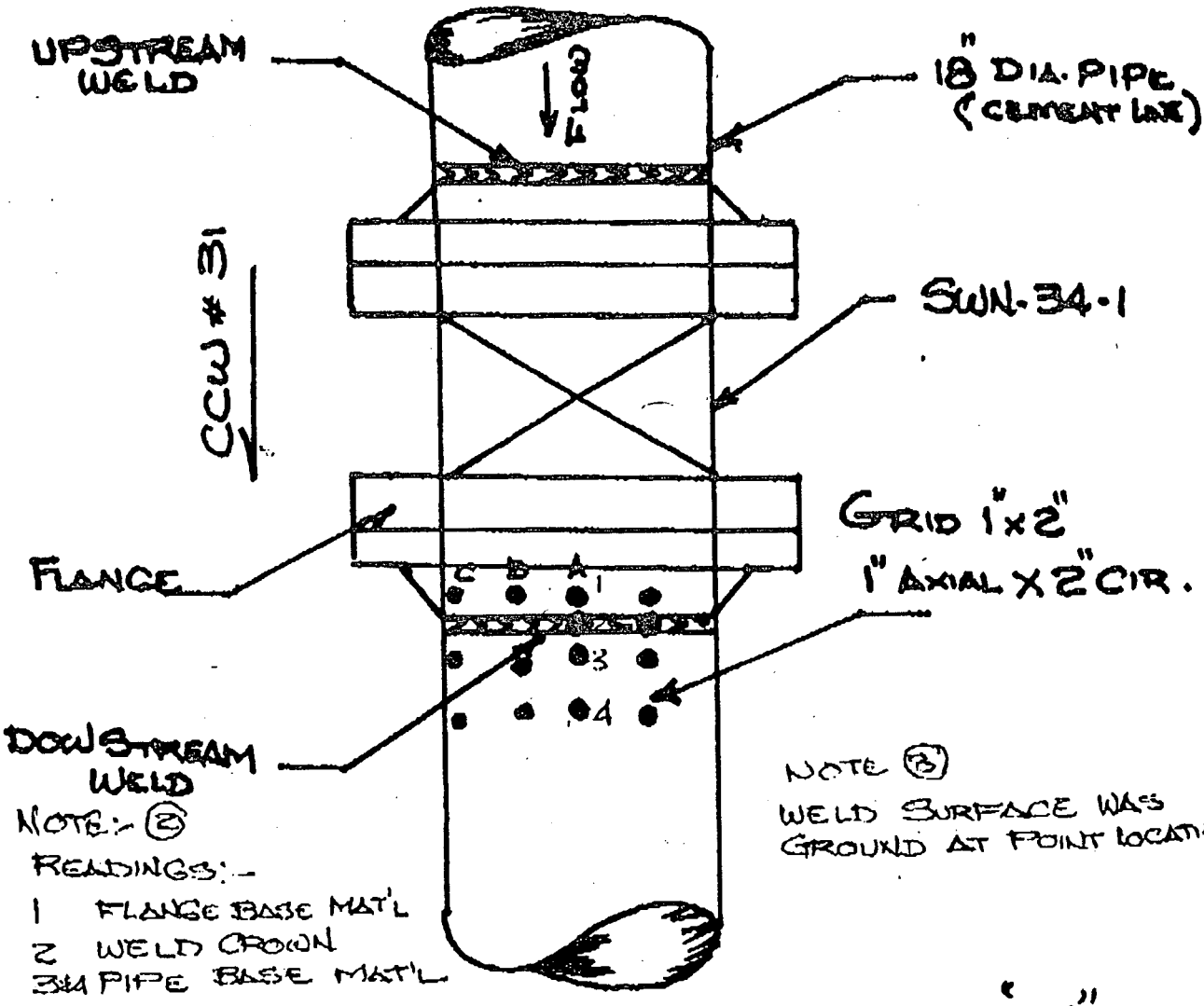
QA-IP3 ID:73685776 APR 19'99 9:05 No.002 P.02

New York Power Authority

Sketch/Attachment

Report No.: 99UT027
Page 3 of 3

Sys. /Comp. ID: Service Water / SWN - 34 - 1
Exam Item: Line 411 Piping
DWG No. or Sketch: 9321-F-27223
WR/Mod: 99-00044-03
QA Category: Cat 1 ASME XI Class: III Cat: N/A
Procedure: NDEP 9.4-12 (I) Rev.: 1



NOTE:- (1) T/WALL LEAK AT GRID LOCATION "J" IN THE CENTER OF WELD CAP.

Examiner: Siraj H. Memon Level: III Date: 4/19/99

Examiner: N/A Date: 4/19/99

Reviewed by: Level: III Date: 4/19/99

ANII Review: Date:

Attachment II To IP3-CALC-SWS-03010 Rev. 0

15 pages

page 1

FORM 5810 REV. 4/91

United Engineers & Constructors
A Raytheon Company

CALCULATION SUMMARY & CONTROL SHEET
Page 1 of 2A

SAFETY RELATED

CALCULATION SET NO			
6604.343-C-SW-005			
PRELIM	FINAL	VOID	REVISION
	✓		0

DISCIPLINE MECH

JO 6604.343

PROJECT TITLE NYPA-IP3

STRUCTURE OF SYSTEM S.W. PIPING DESIGN CLASSIFICATION ANSI B31.1-1967

SUBJECT S.W. LINES 407/411 ANALYSIS FOR VALVE WEIGHT CHANGE

COMPLETED BY P. Dell'Arciprete / Philip Dell'Arciprete DATE 11-17-93

CHECKED BY Z.B. OLSZEWSKI / Z.B. Olszewski DATE 11.17.93

APPROVED BY R.M. KILLEN / R.M. Killen DATE 11.17.93

AV 11/19/93 SDE OR MGR OF STAFF GROUP

REASON FOR REVISION

N/A

TOTAL NUMBER OF SHEETS IN THIS ISSUE SEE SH. 2A

SHEETS REVISED, ADDED OR DELETED

PROBLEM STATEMENT:

PERFORM PIPING STRESS ANALYSIS ON THE SERVICE WATER LINES 407 AND 411 DUE TO INCREASED WEIGHT ON VALVES: SWN-31 SWN-32, SWN-33-1, SWN-33-2, SWN-34-1 AND SWN-34-2 (REF. 7). THE ANALYSES CONSIST OF PRESSURE, DEADWEIGHT AND SEISMIC LOADINGS. THE ANALYSES RESULTS WILL BE USED TO EVALUATE PIPING STRESSES, LOADS ON SUPPORTS AND NOZZLE LOADS. FOR ADDITIONAL DETAILS SEE INTRODUCTION SECTION 1.0

SUMMARY CONCLUSIONS:

BASED ON THE ANALYSES PERFOMED ON THE SERVICE WATER LINES 407/411 THE FOLLOWING HAVE BEEN CONCLUDED:

- PIPING STRESS CALCULATED MEET THE CODE ANSI B31.1 REQUIREMENTS (SEE SHT. 4 & 5)
- PIPE SUPPORT LOADS ARE CALCULATED AND HAVE BEEN EVALUATED FOR (Y/C). DETAILED CALCULATION RESIZED TO VERIFY ACCEPTABILITY OF SUPPORT DESIGN.
- HEAT EXCHANGER NO. 31 AND NO. 32 NOZZLE LOADS ARE CALCULATED AND MEET THE VENDOR ALLOWABLES (SEE SHTS 7 & 8).

NOTE: THIS ANALYSIS SUPERSEDES THE EXISTING UE&C MCD NO.

Attachm. page 2.

FORM 5810 REV 4/81

CALCULATION SUMMARY & CONTROL SHEET Page 2 of 2A	CALCULATION SET NO. 6604.343-C-SW-005			
	PRELIM	FINAL	VOID	REVISION
		✓		0
	DISCIPLINE MECH.			
PROJECT TITLE NYPA - IP3	JO 6604.343			

DESIGN BASIS:

REFERENCES 1 THROUGH 11

UNVERIFIED ASSUMPTIONS/OPEN ITEMS:

NONE

REFERENCES: (SPECIFICATIONS, DRAWINGS, CODES, CALCULATIONS, TEXTS, REPORTS, COMPUTER DATA, FSAR, ETC.) (CONT'D ON SHT. 2A)

1. CRITERIA FOR DESIGN OF CLASS I PIPING FOR IP-3 BY W & UE&C (6.15.73)
2. ANSI B31.1-1967, POWER PIPING CODE
3. W SEISMIC RESPONSE SPECTRA FOR IP-3 (REV. 11.10.71), (UE&C F.P. 9321-05-1455)
4. NYPA DWG. 9321-F-55163, REV. 6, DT. 10-4-93 (LINE 411)
5. NYPA DWG. 9321-F-55123, REV. 10, DT. 10-4-93 (LINE 407)
IUP-9578 TASK AUTHORIZATION REQUEST DT. OCT. 20, 1993
TELECOPY TRANSMITTAL IPU-91425 DT. 11-12-93 FROM AHMET UNSAL TO Z.B. OLSZEWSKI. (SEE ATT. 'C')
8. TELECOPY IUP-9579 / IPU-91413 DT. OCT 21, 1993
9. JOSEPH OAT CORPORATION REPORT TM-1233, REV. 2 [illegible]
[illegible] NOZZLE ALLOWABLE [illegible]

attach p. 3

FORM 3087 REV. 4/91

United Engineers & Constructors
A Stone & Webster Company

GENERAL COMPUTATION SHEET

CALCULATION SET NO.			REV	COMP. BY	CHKD. BY
6604.343-C-SW-005			0	PDA DATE 11-17-93	YLO DATE 11.17.93
PRELIM	FINAL	VOID			
	✓				
SHEET 1 OF 19				DATE	DATE
JO. 6604.343					

PROJECT NYPA - IP3

SUBJECT S.W. LINES 407/411 ANALYSIS

CONTENTS:

1. INTRODUCTION
2. STRESS SUMMARY
3. HEAT EXCHANGER NOZZLE QUALIFICATION
4. SUPPORT DATA SHEET

ATTACHMENTS:

A. ANALYTICAL MODEL DRAWINGS UE&C
6604-SK-160005, SHT. 1 (LINE 411)
SHT. 2 (LINE 407)

B. COMPUTER PRINTOUT PIPING ANALYSIS FOR PRESSURE, DEADWEIGHT AND SEISMIC LOADS

C. TELECOPY TRANSMITTAL IPU-91425 FROM AHMET UNSAL TO Z.B. OLSZEWSKI DT. NOV. 10, 1993

D. TELECOPY TRANSMITTAL IPU-91426 FROM J. TOMPKINS TO C. ANDERSON / Z. OLSZEWSKI DT. NOV. 16, 1993; CONFORMATORY AS-BUILT WALKDOWN.

0012118

Attachment p. 4

FORM 5307 REV 4/91

Stone & Webster Engineers & Constructors
A Raytheon Company

GENERAL COMPUTATION SHEET

CALCULATION SET NO			REV	COMP BY	CHK'D BY
6604-343-C-SW-005			0	PDA DATE 11-17-93	KO DATE 11.17.93
PRELIM	FINAL	VOID			
	✓				
SHEET 2A OF 2A			1	PDA DATE 12-7-93	KO DATE 12.7.93
JO 6604.343					

PROJECT NYPA - IP 3

SUBJECT S.W. LINES 407/411 ANALYSIS

REFERENCES : CONT'D

11. UE & C MCD NO. 416 ANALYSIS FOR LINES 407/411 FOR NRC I.E. BULLETIN 79-07 DATED 8-22-79

12. IUP-91445, NYPA COMMENTS ON SW LINES 407 & 411 EVALUATION, DATED 11.30.93 △1

TOTAL NUMBER OF SHEETS IN THIS ISSUE:

CONTROL SHEETS - ~~3~~ 5 SHTS △1

CALCULATION - 19 SHTS

ATTACH. 'A' - 1 SH. + (2) ISOS

'B' - COMP. PRINTOUT

'C' - 3 SHTS

'D' - 5 SHTS

NOTE: The image below is less clear than this notice is due to poor quality of the document being filmed.

attachm. p.5

FORM 5810 REV 4/91

United Engineers & Constructors
A Raytheon Company

CALCULATION SUMMARY & CONTROL SHEET
Page 1 of 2

CALCULATION SET NO 6604.343-C-SW-005

PRELIM	FINAL	VOID	REVISION
	✓		1

DISCIPLINE MECH.

JO 6604.343

SAFETY RELATED

PROJECT TITLE NYPA - IP3

STRUCTURE OF SYSTEM S.W. PIPING DESIGN CLASSIFICATION ANSI B31.1-1967

SUBJECT S.W. LINES 407 & 411 ANALYSIS FOR VALVE WEIGHT CHANGE

COMPLETED BY P. DELL'ARCIPRETE / [signature] DATE 12-7-93

CHECKED BY Z.B. OLSZEWSKI / [signature] DATE 12 7.93

APPROVED BY R.M. KILLEN / [signature] DATE 12-8-93

CA 12/9/93 SDE OR MGR OF STAFF GROUP

REASON FOR REVISION.

REVISED TO INCORPORATE NYPA COMMENTS (REF. 12) TO CLARIFY THE METHOD OF SUMMATION OF MODAL RESPONSES IN SEISMIC DYNAMIC ANALYSIS. ADDED STATEMENT: 'MODAL RESPONSES WERE COMBINED IN ACCORDANCE WITH REGULATORY GUIDE 1.92'

TOTAL NUMBER OF SHEETS IN THIS ISSUE SEE SH. 2A

SHEETS REVISED, ADDED OR DELETED REVISED CONTROL SH. 2A AND SH. 2

PROBLEM STATEMENT:

SEE REV. 0

RECEIVED

Attach. p. 6

5007 REV 4/81

United Engineers & Constructors

GENERAL COMPUTATION SHEET

CALCULATION SET NO			REV	COMP. BY	CHK'D. BY
6604.343-C-SW-005			0	PDA DATE 11-17-93	HO DATE 11.17.93
PRELIM	FINAL ✓	VOID			
SHEET 2 OF 19			1	PDA DATE 12-7-93	HO. DATE 12.7.93
JO 6604.343					

OJECT NYPA IP-3

BJECT S.W. LINES 407/411 ANALYSIS

1. INTRODUCTION:

AT THE REQUEST OF NYPA (TASK AUTHORIZATION 1UP-9578) UE & C NUCLEAR PRESENTS THE ANALYSIS FOR THE SERVICE WATER (SW) LINES 407 AND 411 WITH THE HEAVIER VALVE WEIGHTS (REF. 7). THE ANALYSIS CONSIST OF PRESSURE, DEADWEIGHT AND SEISMIC LOADINGS. THE LOADINGS ARE EXECUTED BY UTILIZING THE ADLPIPE PROGRAM. THE RESULTS FROM THE COMPUTER ANALYSIS WILL BE USED TO EVALUATE PIPE STRESS PIPE SUPPORT CAPACITY AND EQUIPMENT NOZZLES CAPACITY BY COMPARING WITH THE VENDOR ALLOWABLES (REF. 9).

THE SW LINES MATH MODEL ARE BASED ON THE EXISTING MODEL FROM NRC I.E. BULLETIN 79-07 (REF. 11). THE MODEL HAS BEEN UPDATED TO INCLUDE THE LATEST REVISED DRAWINGS (REF. 4 & 5) AND A CONFIRMATORY AS-BUILT WALKDOWN (REF. 10).

GENERALLY, FOR DYNAMIC ANALYSIS TWO COMPUTER RUNS WERE MADE (REF. 11); ONE IN THE NORTH-SOUTH AND VERTICAL DIRECTIONS AND THE OTHER IN THE EAST-WEST AND VERTICAL DIRECTIONS. HOWEVER, TO AVOID SOME CONSERVATISM THE THREE DIRECTION RESPONSE SPECTRUM (EAST-WEST + VERTICAL + NORTH-SOUTH) METHOD WAS USED TO DETERMINE THE SEISMIC LOAD. ~~THE SRSS METHOD WAS USED TO COMBINE MODAL MODE.~~ THE CUT-OFF FREQUENCY WAS 33 CPS. THE SRSS METHOD WAS ALSO USED FOR COMBINING THE THREE DIRECTIONS OF SEISMIC LOAD. MISSING MASS CONTRIBUTION ZPA WAS ADDED ABSOLUTELY TO THE MODAL RESPONSE FROM FLEXIBLE RANGE (< 33 CPS). MODAL RESPONSES WERE COMBINED IN ACCORDANCE WITH REGULATORY GUIDE 1.92.

NOTE: The image below is less clear than this notice
it is due to the poor quality of the document being filmed.

Attachm. p.7

FORM 5007 REV. 4/91

United Engineers & Constructors
A Raytheon Company

GENERAL COMPUTATION SHEET

CALCULATION SET NO			REV	COMP BY	CHK'D BY
6604.343-C-SW-005			0	PDG	K.O.
PRELIM	FINAL	VOID		DATE 11-17-93	DATE 11.17.93
	✓				
SHEET 3 OF 19				DATE	DATE
JO 6604.343					

PROJECT NYPA IP-3

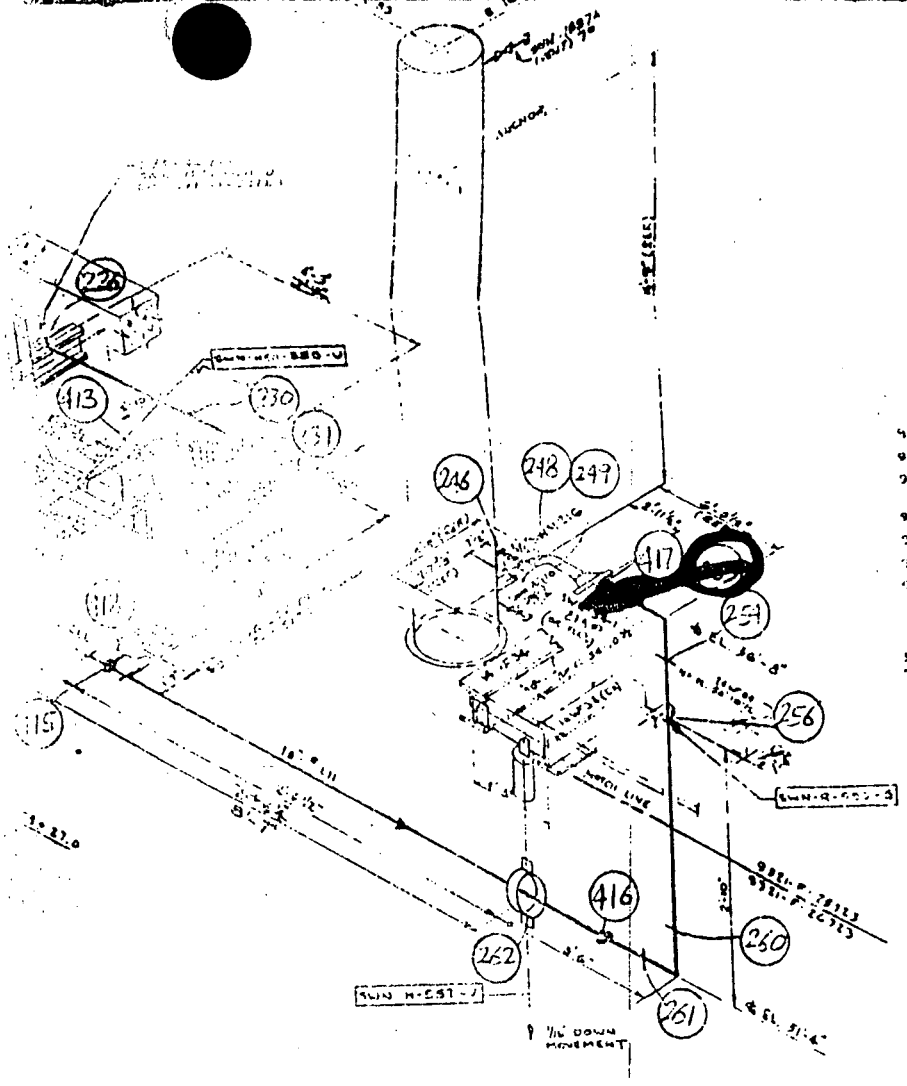
SUBJECT S.W. LINES 407/411 ANALYSIS

1. INTRODUCTION: CONT'D

NOTE, DURING THE ANALYSIS PROCESS DESCREPACIES WERE OBSERVED FOR THE VALUE WEIGHTS FROM REF. 7 AND THE ISOMETRICS REF. 4 AND 5. THE DESCREPANCIES ARE AS FOLLOWS:

VALUE IP	ISO WT.	REF. 7 WT	%
SWN-31, SWN-32	1050 lb	1060 lb	+ 1%
SWN-33-1, SWN-32-2, SWN-34-1, SWN-34-2	818 lb	856 lb	+ 5%

THE ADDITIONAL WEIGHTS ARE SMALL AND CONSEVATIVE THEREFORE, THEY ARE CONSIDERED ACCEPTABLE.



REFERENCE DWGS

9321-F-27223 FLOW DIAG SERVICE WATER SYS NUCLEAR STM SUPPLY PLANT.
9321-F-25723 P.A.B. COMP. PIPING AREA AT EL. 55'-0" SHT. Nº 3
9321-F-26723 P.A.B. COMP. PIPING AREA IN TUNNELS AT EL. 41'-0" PLANS, SECTIONS SHT Nº 1
9321-F-21003 SERVICE WATER PIPING IN YARD AREA PLANS SHT Nº 1
9321-F-13153 P.A.B. DETAILS OF STAIRS Nº 2, 3 & 4
9321-F-11683 P.A.B. CONCRETE FLOOR AT EL 41'-0"
9321-F-26113 COMP. PIPE IN TRENCHES SHT Nº 1

NOTES: 1. FOR PIPE SUPPORT DETAILS SEE DWG. 9321-[illegible]-60449 SH.1 THRU 6.
2. FOR COMPONENT COOLING HEAT EXCHANGER SUPPORT DETAILS SEE DWG. 9321-[illegible]-60449 SH.7, 7A & 8.

PROJ.		0	PD'A	76.0.
FINAL	660A 313-CSU-005		DATE 11-17-93	DATE 11.17.93
VOID				
			DATE	DATE

660A-SK-167005

6		AS PER TEL. DCR # 100091601		
5		AS PER REV. 03 & 04 DCR # 300092716		
4		AS PER LINE WALK		
3		FINAL ISSUE		
2				
1				
0		FOR DETAILING		
0				

UNITED ENGINEERS & CONSTRUCTORS INC.

SITE ITEM Nº 28E3

WESTINGHOUSE ELECTRIC CORPORATION
PRIMARY AUXILIARY BUILDING
RESTRAINT & SUPPORT DESIGN
LINE 411
for
CONSOLIDATED EDISON COMPANY
INDIAN POINT GENERATING STATION
UNIT NO. 3

U.E.&C. DWG. NO. 9321-F-55163-6
WEC DWG. NO. A205416

Attachment 8

6604.343, DRPA-IP7, SERVICE WATER PIPING SYSTEM
LINE 407 AND LINE 411 (PROB 4168432)
DE&C DWG NO 9321-F-55163, REV.6, AND 9321-F-55123, REV. 10
DEADWEIGHT

CONDITION 0
LOADS
DEADWEIGHT
THERMAL
PRESSURE
STRESS UNITS(LB/SQ IN)

USAS B31.1 STRESS REPORT

CDC	MEM	SEQ	POS	TYPE	TORSION	BENDING	COMBINED	PRESSURE	INTENSIFICATION FACTORS IN PLANE	INTENSIFICATION FACTORS TRANSVERSE
0	4	261	BEG	EL	-20.8	1338.5	1339.2	1688.3	3.500	3.500
		260	END	EL	16.1	273.8	275.7	1688.3	3.500	3.500
	5	260	BEG	RU	16.1	78.2	84.6	1688.3	1.000	1.000
		255	END	RU	16.1	86.3	92.1	1688.3	1.000	1.000
	6	255	BEG	RU	16.1	86.3	92.1	1688.3	1.000	1.000
		254	END	RU	16.1	86.6	92.4	1688.3	1.000	1.000
		254	BEG	[illegible]	[illegible]	303.0	304.7	1688.3	3.500	3.500
		[illegible]	END	[illegible]	[illegible]	393.3	406.8	1688.3	3.500	3.500
0	8	253	BEG	RU	52.0	112.4	153.1	1688.3	1.000	1.000
		252	END	RU	52.0	115.2	155.2	1688.3	1.000	1.000
	9	252	BEG	[illegible]	27.7	61.3	82.6	789.1	1.000	1.000
		417	END	[illegible]	27.7	66.1	86.2	789.1	1.000	1.000
0	10	417	BEG	RU	27.7	66.1	86.2	789.1	1.000	1.000
		250	END	RU	27.7	40.8	68.8	789.1	1.000	1.000
10	11	250	BEG	RU	41.9	61.6	104.0	1888.2	1.000	1.000
		249	END	RU	41.9	50.6	97.8	1888.2	1.000	1.000
10	12	249	BEG	EL	41.9	190.5	208.0	1888.2	3.766	3.766
		248	END	EL	113.4	993.4	1021.2	1888.2	3.766	3.766
10	13	248	BEG	RU	118.4	263.8	354.5	1888.2	1.000	1.000
		246	END	RU	118.4	265.5	355.8	1888.2	1.000	1.000
11	1	415	BEG	RU	50.6	362.8	376.6	1688.3	1.000	1.000
		266	END	RU	50.6	69.8	122.9	1688.3	1.000	1.000
11	2	266	BEG	RU	26.9	37.2	65.5	789.1	1.000	1.000
		418	END	RU	26.9	23.0	58.6	789.1	1.000	1.000
	[illegible]	[illegible]	BEG	[illegible]	[illegible]	23.0	58.6	789.1	1.000	1.000
		[illegible]	END	RU	26.9	49.1	72.9	789.1	1.000	1.000

Attachment P.9

DIS/ADLPIPE ADLPIPE STRESS ANALYSIS CDC 3E1A 0 93/11/05 17.23.58.

GROUP 343, NYPA-IP3, SERVICE WATER PIPING SYSTEM
LINE 407 AND LINE 411 (PROB 416&432)
DESC DWG NO 9321-F-55163, REV.6, AND 9321-F-55123, REV. 10
SEISMIC X+Y+Z (OBE)

CONDITION 21
LOADS
SHOCK
STRESS UNITS(LB/SQ IN)

MODAL STRESS SUMMARY, TOTAL NUMBER OF MODES 47
BENDING MOMENTS ARE SQUARE ROOT SUM OF THE SQUARE.
USAS B31.1 STRESS REPORT

SEG	ITEM	SEG POS	TYPE	TORSION	BENDING	COMBINED	PRESSURE	INTENSIFICATION FACTORS IN PLANE	TRANSVERSE
18	2	[illegible]	BEG EL	325.4	1371.3	1517.8	.0	3.500	3.500
		250	END EL	258.5	1499.3	1585.9	.0	3.500	3.500
18	3	360	BEG RU	258.5	428.3	671.4	.0	1.000	1.000
		256	END RU	258.5	632.4	816.8	.0	1.000	1.000
18	4	256	BEG RU	258.5	632.4	816.8	.0	1.000	1.000
		25[illegible]	END RU	258.5	591.7	785.7	.0	1.000	1.000
	5	[illegible]	BEG EL	258.5	2071.2	2134.7	.0	3.500	3.500
		253	END EL	-313.8	832.8	[redacted]	.0	3.500	3.500
18	6	253	BEG RU	-313.8	237.9	671.2	.0	1.000	1.000
		252	END RU	-313.8	240.8	672.2	.0	1.000	1.000
18	7	252	BEG RU	-167.1	128.2	358.0	.0	1.000	1.000
		417	END RU	-167.1	152.8	367.5	.0	1.000	1.000
19	1	417	BEG RU	-167.1	152.8	387.5	.0	1.000	1.000
		250	END RU	-167.1	200.1	389.5	.0	1.000	1.000
19	2	250	BEG RU	-252.6	302.4	588.8	.0	1.000	1.000
		249	END RU	-252.6	327.5	602.0	.0	1.000	1.000
19	3	249	BEG EL	-252.6	1233.1	1332.6	.0	3.766	3.766
		248	END EL	-325.8	1423.2	1565.3	.0	3.766	3.766
19	4	248	BEG RU	-325.8	377.9	753.2	.0	1.000	1.000
		246	END RU	-325.8	378.2	753.3	.0	1.000	1.000
20	1	415	BEG RU	397.6	2150.9	2292.9	.0	1.000	1.000
		266	END RU	397.6	1748.1	1920.5	.0	1.000	1.000
20	2	266	BEG RU	211.8	930.9	1022.8	.0	1.000	1.000
		418	END RU	211.8	847.6	947.5	.0	1.000	1.000
21	1	418	BEG RU	211.8	847.6	947.5	.0	1.000	1.000
		268	END RU	211.8	771.2	879.9	.0	1.000	1.000

NOTICE: If the image below is less clear than this notice, it due to the poor quality of the document being filmed.

Attachment p.10

If the image below is less clear than this notice to the poor quality of the document being filmed.

Attachm. p. 11

CALC. NO. 6604.343-C-SW-005

2. STRESS SUMMARY:

REV	COMP. BY	CHK'D BY
0	PDM DATE 11-17-83	[illegible] DATE 11.17.83
	DATE	DATE

SHT 4 OF 19

NEW YORK POWER AUTHORITY

INDIAN POINT NUCLEAR STATION -UNIT 3

CLASS I LINE STRESS REPORT

UNITED ENGINEERS & CONSTRUCTORS INC.- J.C. 6604.343

Form 10.72

Page 1/2

1. Line No.: 407 411	2. Piping System: SERVICE WATER
3. U.E.& C. Dwg. No.: 9321-F-55163 9321-F-55123	Rev. 5 10

4. System Conditions:	I	II	III	IV	V
Temperature (°F)	75	–	–	–	–
Design Pressure (PSI)	150	–	–	–	

5. Pipe Data	Nom. Size (IN)	20	18	@NP.253
	Schedule or Wall Thkn. (IN)	.375	.375	
	Material ASTM	A53, GR. B	A53, GR. B	
	Material Spec. No.	SWN	SWN	
	Contents	WATER	WATER	
	Insulation	–	–	
6. Max. Stress Levels (PSI) and Location	D - Deadweight	2466 @ PT. 333		407 psi
	T - Thermal (Max. for all Cond.)	–		
	P - Pressure (Longitudinal)	1888		
	E - Earthquake (OBE)	5243 @ PT. 316		1043 psi
	T° - Thermal Transient	–		
	P° - Pressure Transient	–		
	E' - Earthquake (DBE)	7865 @ PT. 316		1565
	P' - Pipe Rupture	–		
	P'A - Safeguard Loading	–		
7. Max. Stress Intensity (PSI)	Normal: $F = D + P \leq S_h$	4354		2095.
	$F = T \leq S_A$	–		
	Upset: $F = D + P + P^\circ \leq 1.2S_h$	–		
	$F = D + P + E \leq 1.2S_h$	9597		3138.
	$F = T^\circ \leq S_A$	–		
	$F = D + P + P'_A \leq$ [illegible]	–		
	$F = D + P + P'_A + E \leq 1.2S_h$	–		
	Emergency: $F = D + P + E' \leq$ [illegible]	12219		3660.
	$F = D + P + P'_A + E' \leq$ [illegible]	–		
	$F = D + P'$ [illegible]	–		

(MAX. STRESSES FOR 20" & 18" PIPE)

This summary is calculated based on output (p. 8-10 THIS attachm.)

NOTICE: If the image below is less clear than this notice it is due to the poor quality of the document being filmed.

Attachm. p. 12

2. STRESS SUMMARY: CONT'D

CALC. NO. 6609.343-C-SW-005
SHT 5 OF 19

Form 10.72

Page 2/2

8. Stresses Obtained by:	D	T	P	E	T°	P°	E'	P'_A	P'
Computer Analysis (Program Used):	ADL	-	ADL	ADL	—	—	—	—	—
Simplified Methods or Hand Calc.:	—	—	—	—	—	—	X	—	—

9. Code Allowable Stresses (PSI):	Material ASTM	Min.Temp. S_c	Max.Temp. S_h	Yield Strength S_y
	A53 GR. B	15,000	15,000	32,000

10. Stress Limits: (PSI)			
	Stress Range:	$S_A = f(1.25S_c + .25S_h)$	22,500
	Additive Stresses:	$1.2\ S_h$	18,000
Emergency & Faulted Cat.	Membrane Stress: (Greater of:)	$K_B = 1.2\ S_h$	—
		$K_B = 0.8\ S_y$	—
	Membrane + Bending Stress: (Greater of:)	$K_B = 1.8\ S_h$	27,000
		$K_B = 1.0\ S_y$	32,000

11. Stress Analyst: (Signature)	~~Thermal &~~ Weight	Seismic	Engineer - State Reg. No.
	P. Dell'Acqua	P. Dell'Acqua	H. Olszewski NY-052342-1

12. Remarks: (1) DBE = 1.5(OBE) COMPUTED

REFERENCES:

1. Power Piping Code USAS B.31.1.0. - 1967
2. ASME Boiler and Pressure Vessel Code - Section VIII
3. Criteria for Design of Class I Piping System INP - 3 by W
4. Seismic Response Curves for Class I Building for INP - 3 by W

Seismic Response Curves Used:	Direction	OBE	DBE
	N - S 1 - 2	D.1.2 MODIF. FOR OBE (EL. 55'-0")	1.5 OBE
	E - W 2 - 3	D.3.2 MODIF FOR OBE (EL. 55'-0")	1.5 OBE

ATTACHMENTS:

1. Isometric Drawing No.: 9321-F-55163-6 (LINE 411)
2. Computer Printouts Dated: Thermal, Cond. —
   Weight: 11-5-93
   Seismic ~~(N-S)~~ X+Y+Z
3. List of Loads on Supports Dated: Thermal: — 11-5-93
   Weight: —
   Seismic (Max.): —
   Whip Restraints: —

REV.	CHKD. BY	CHK'D. BY
0	PDA DATE 11-17-93	H.O. DATE 11.17.93

Attachm. p.13

FORM 5007 REV. 6/81

United Engineers & Constructors
A Raytheon Company

GENERAL COMPUTATION SHEET

CALCULATION SET NO	REV	COMP BY	CHK'D BY
6604.343-C-SW-005	0	PDA DATE 11-17-93	YLD. DATE 11.17.93
PRELIM / FINAL ✓ / VOID			
SHEET 6 OF 19		DATE	DATE
JO 6604.343			

PROJECT NYPA IP-3

SUBJECT S.W. LINES 407/411 ANALYSIS

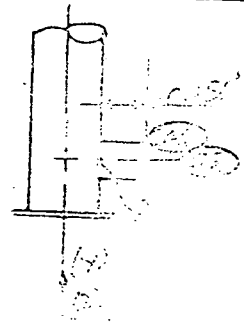
3. HEAT EXCHANGER NOZZLE QUALIFICATION:

QUALIFICATION OF COOLING WATER HEAT EXCHANGERS NO. 31 AND NO. 32 (IP3V-299.001) WITH THE VENDOR ALLOWABLES.

ENVELOPED DESIGN LOADS FROM COMPUTER OUTPUT (N.P. 246 & 278) HAVE BEEN USE FOR THE QUALIFICATION. ALSO THESE LOADS ARE TRANSFORMED TO THE SURFACE (A) OF HX FOR THE VENDOR ALLOWABLES COMPARISON.

LOAD	FORCE (lb)			MOMENT (FT-lb)		
	Fx	Fy	Fz	Mx	My	Mz
DWT	101	-1967	136	2433	38	3869
OBE	1495	1471	2555	9835	8163	5878
DBE 1.5(OBE)	2243	2207	3833	14753	12245	8817
TOTAL NOR.	101	-1967	136	2433	38	3869
TOTAL UPSET	1596	-3438	2691	12268	8201	9747
TOTAL FAULTED	2344	-4174	3969	17186	12283	12686

NOTE: NORM. = DWT
UPSET = DWT + OBE
FAULTED = DWT + DBE



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Attachm. p.14

FORM 5007 REV 4/91

United Engineers & Constructors
A Stone & Webster Company

GENERAL COMPUTATION SHEET

CALCULATION SET NO	REV	COMP BY	CHK'D BY
6604.343-C-SW-005	0	PDA DATE 11-17-93	JGD. DATE 11.17.93
PRELIM / FINAL ✓ / VOID			
SHEET 7 OF 19		DATE	DATE
JO 6604.343			

PROJECT NYPA IP-3

SUBJECT S.W. LINES 407/411 ANALYSIS

3. HEAT EXCHANGER NOZZLE QUALIFICATION: CONT'D

QUALIFICATION OF COOLING WATER HX NO. 31 & 32 WITH THE VENDOR ALLOWABLES

LEVEL		CALCULATED LOAD		ALLOWABLE LOAD (REF. 9)		RATIO CAL/ALLOW ≤ 1.0	REMARKS
NORMAL DWT	FORCE (lb)	Fx	101	Fx	4000	.03 < 1.0	O.K.
		Fy	1967	Fy	4000	.49 < 1.0	
		Fz	136	Fz	1000	.14 < 1.0	
	MOM. (FT-lb)	Mx	2433	Mx	3750	.65 < 1.0	
		My	38	My	8177	.005 < 1.0	
		Mz	3869	Mz	6875	.56 < 1.0	
UPSET DWT + OBE	FORCE (lb)	Fx	1596	Fx	7000	.23 < 1.0	
		Fy	3438	Fy	7000	.49 < 1.0	
		Fz	2691	Fz	4500	.60 < 1.0	
	MOM. (FT-lb)	Mx	12268	Mx	14167	.87 < 1.0	
		My	8201	My	13047	.63 < 1.0	
		Mz	9747	Mz	13906	.70 < 1.0	

NOTE: Fx - RADIAL Mx - TORQUE
Fy - [illegible] - CIRC.
Fz - [illegible] - LONG.

NOTICE: If the image below is too dim, then this notice is the poor quality of the document being filmed.

Attachment 2; p. 15

FORM 5907 REV 4/91

United Engineers & Constructors
A Stone & Webster Company

GENERAL COMPUTATION SHEET

CALCULATION SET NO	REV	COMP BY	CHK'D BY
6604.343-C-SW-005	0	PD'A DATE 11-17-93	H.O. DATE 11.17.93
PRELIM / FINAL ✓ / VOID			
SHEET 8 OF 19		DATE	DATE
JO 6604.343			

PROJECT NYPA IP-3

SUBJECT S.W. LINES 407/411 ANALYSIS

3. HEAT EXCHANGER NOZZLE QUALIFICATION: CONT'D

QUALIFICATION OF COOLING WATER HX NO. 31 & 32 WITH THE VENDOR ALLOWABLES

LEVEL	CALCULATED LOAD			ALLOWABLE LOAD (REF. 9)		RATIO $\frac{CAL}{ALLOW} \leq 1.0$	REMARKS
FAULTED DWT + OBE	FORCE (lb)	Fx	2344	Fx	9000	.26 < 1.0	O.K.
		Fy	4174	Fy	9000	.46 < 1.0	
		Fz	3969	Fz	6500	.61 < 1.0	
	MOM. (FT-lb)	Mx	17186	Mx	18333	.93 < 1.0	
		My	12283	My	17734	.69 < 1.0	
		Mz	12686	Mz	17760	.71 < 1.0	
	FORCE (lb)	Fx		Fx			
		Fy		Fy			
		Fz		Fz			
	MOM. (FT-lb)	Mx		Mx			
		My		My			
		Mz		Mz			

NOTE: Fx - RADIAL Mx - TORQUE
Fy - [illegible] [illegible]
[illegible]

ATTACHMENT 3 TO IP3-CALC-SWS-03010 Rev. 0

page 1 of 1

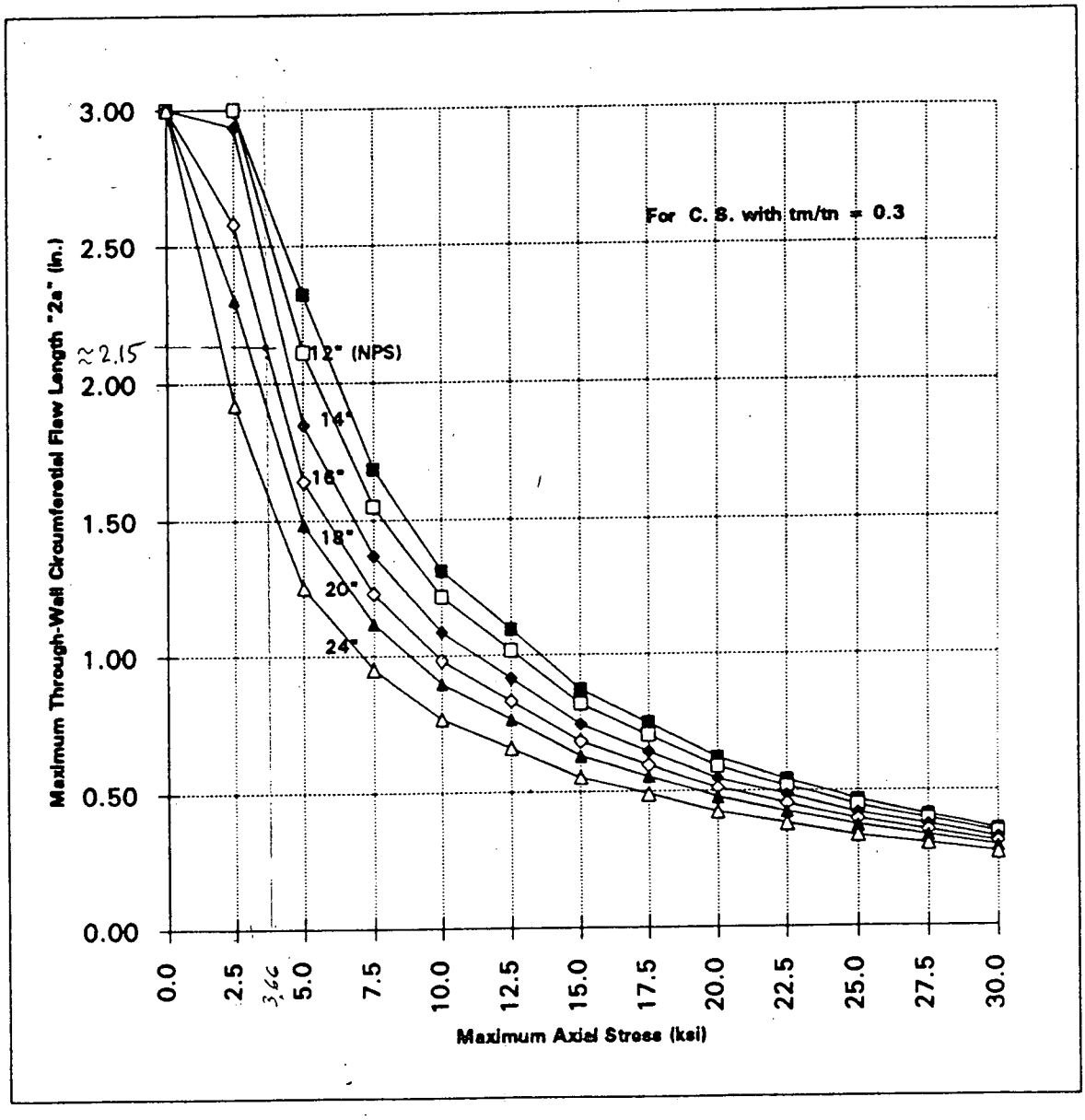


Figure 7 : Maximum Through-Wall Circumferential Flaws for C. S. SW Lines (NPS : 12" to 24")

ATTACHM. 4 TO IP3-CALC-SWS-03010 P. 1 OF 2

New York Power Authority — **Ultrasonic Examination Report**

Report No.: 99UT028
Page 1 of 2

Sys. / Comp. ID: Service Water / SWN - 34 - 1 | Exam Item: Line 411 piping Downstream of SWN34-1

DWG No. or Sketch: 9321-F-27223 | WR/Mod: 99-00044-03

QA Category: Cat 1 | ASME XI Class: III | Cat: N/A | Procedure: NDEP 9.4-12 (I) | Rev.: 1

Component Configuration: CCW Piping

Orientation: 0 Degree | Type of Material: Carbon Steel

Angle: 0 ° | Mode: Longitudinal | Size: 18" Std. wall | Thickness: 0.375"

Equipment

Instrument: 213110 Krautkramer Branson USL 48 Due: 07/13/99

Vertical Linearity Check

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2	50	45	40	35	30	25	20	15	10	5

(Signal 2 shall equal 50% of signal 1 ± 5% of full scale.)

Attenuator Linearity Check

80% - 6 db	80% - 12 db	40% + 6 db	20% + 12 db
40	20	80	80
(32 to 48)	(16 to 24)	(64-96)	(64-96)

Transducer: 0030HD KBA 5 Mhz .25" RND ADP DUAL / GAMMA Wedge: N/A

Search Unit Cable: 6' Self-Cont. | Wedge Meas. Angle: 0 ° | Exit Point-Front: NA "

Couplant: 97120 Sonotech / Soundsafe | Thermometer: QS-18 | Due: 8/5/2000 | Temperature

Calibration Block: IP3 E/C # 3 | Step Wedge T= .15" - .5" Material: Carbon Steel | 68 °F

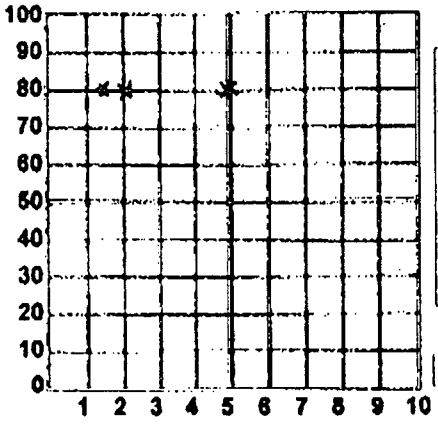
Simulator Block: N/A | N/A °F

Reference Block: N/A | N/A °F

Entry Surface: OD | Component: 65 °F

Distance Amplitude Curve

Each Major Screen Division = 0.1



Reflector	Orient.	% FSH	Pos.	dB
0.151BR	Step	80	1.6	N/A
0.219BR	Step	80	2.1	N/A
0.506BR	Step	80	5.0	N/A

Calibration Times:

1250	1310			

Instrument Settings

Range (in.): 0.5"
Sweep Length: 8.06
Sweep Delay: 8.26
Sensitivity (dB): 58
Frequency (mHz): 5
Reject: Off
Filter: NEG
Pulse Length: Fixed
Damping: Min
Mode Select: Duel
Rep. Rate: Fixed
DEC/Gate: On
Jacks: T&R

Acceptance Standard: As per IP3-CAL-SWS-1596

Recordable Indication(s): Yes | Recording Level: N/A % DAC | Evaluation Level: N/A % DAC

100 % Complete Limitations: Surface painted at most locations, average D.F.T. = 0.009"

Remarks: UT Examination of Line 411 was performed to evaluate wall thinning of 18" dia. pipe Downstream of SWN-34-1. the pipe has leak at grid location "J. Further evaluation was required to perform UT exam.above and below "J" grid location to determine the length of corroded area.

Examiner: Siraj H. Memon Level: III Date: 4/19/99

Examiner: N/A Date: 4/19/99

Reviewed by: Level Date:

ANII Review: Date:

ATTACHM 4 to IP3-CALC-SWS-03010 p.2 of 2

New York Power Authority

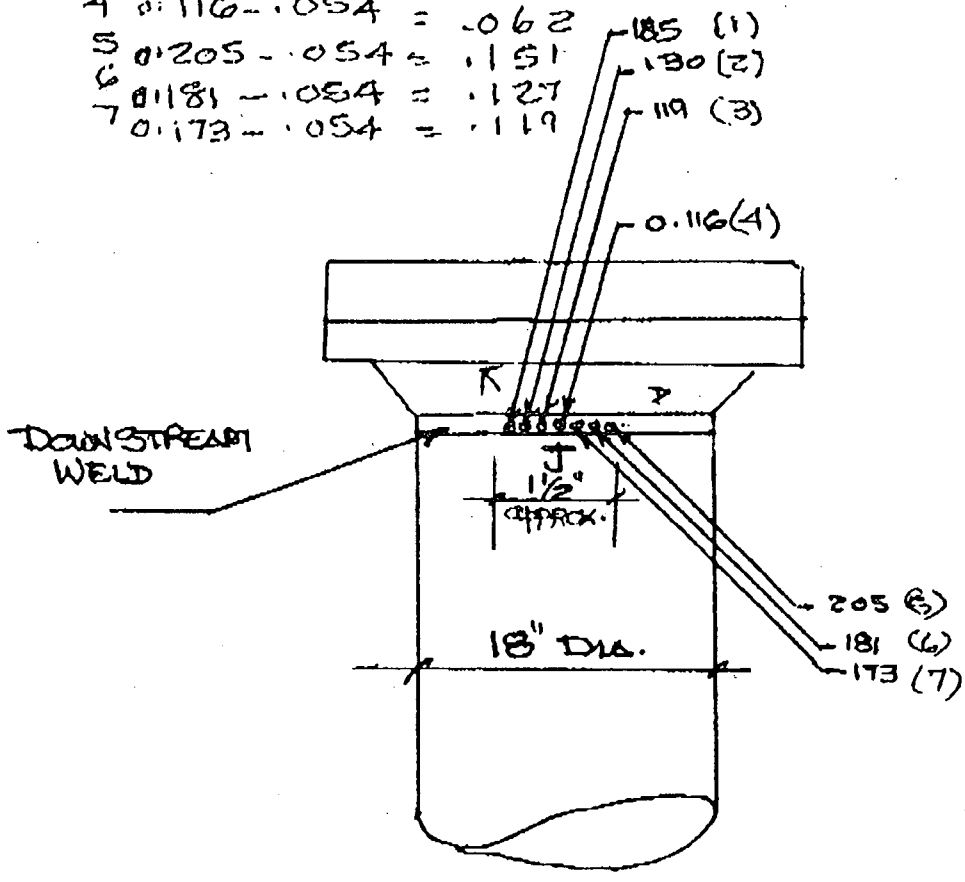
Sketch/Attachment

Report No.: 99UT028
Page 2 of 2

Sys. / Comp. ID:	Service Water / SWN - 34 - 1	Exam Item:	Line 411 piping Downstream of SWN34-1
DWG No. or Sketch:	9321-F-27223	WR/Mod:	99-00044-03
QA Category: Cat 1 ASME XI Class: III Cat: N/A		Procedure:	NDEP 9.4-12 (I) Rev.: 1

NOTE :- ALL READINGS INCLUDE PAINT THICKNESS

	UNCORRECTED	OF	0.054	CORRECTED
1	0.185 - .054	=		.131
2	0.130 - .054	=		.076
3	0.119 - .054	=		.065
4	0.116 - .054	=		.062
5	0.205 - .054	=		.151
6	0.181 - .054	=		.127
7	0.173 - .054	=		.119

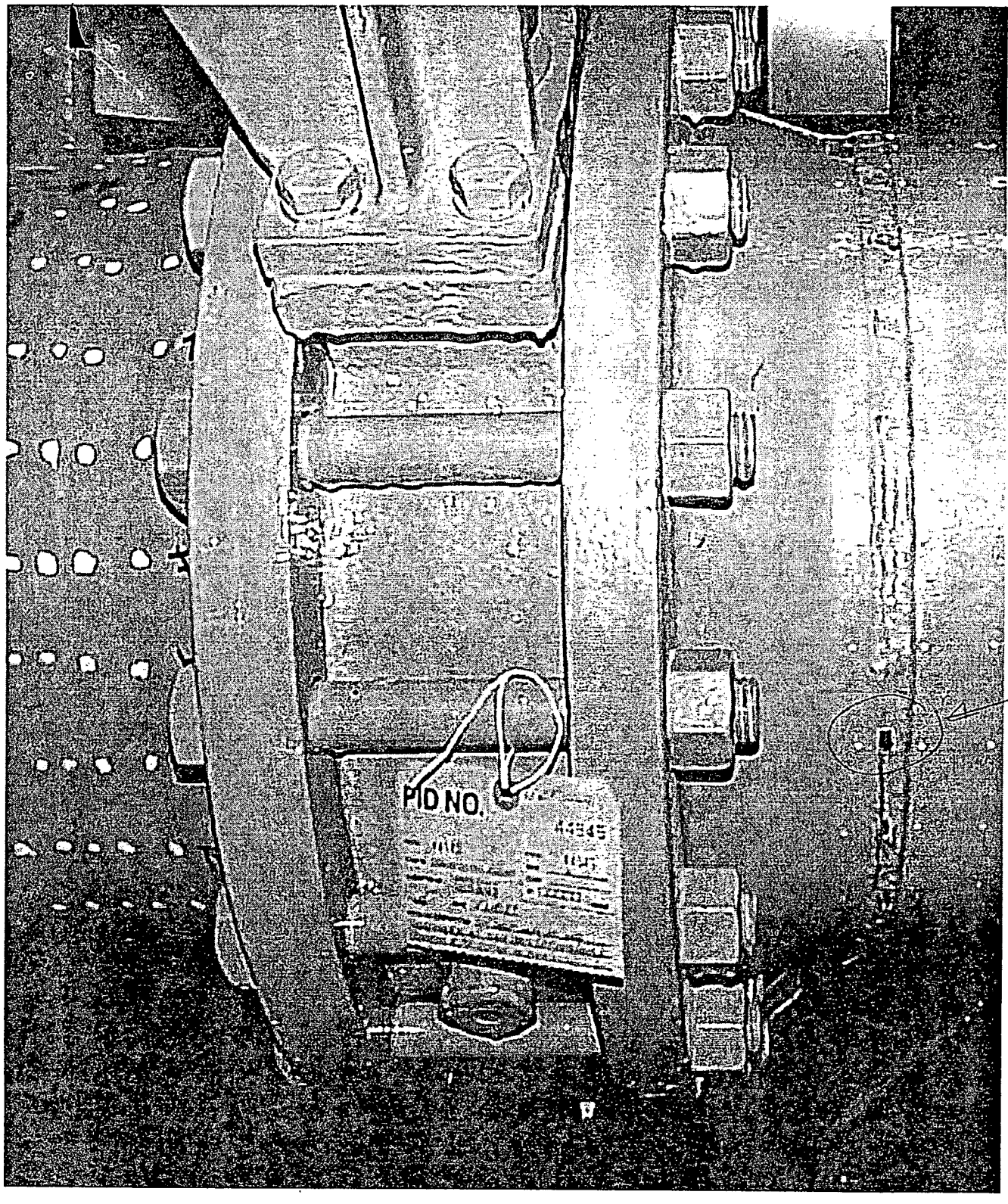


Examiner: Siraj H. Memon Level: III Date: 4/19/99

Examiner: N/A Date: 4/19/99

Reviewed by: Level Date:

ANII Review: Date: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