

# Leroy-Ostrander School District Mechanical Integrity: Steam Piping Thickness Testing

LeRoy-Ostrander Public Schools 406 W Main ST LeRoy, MN 55951

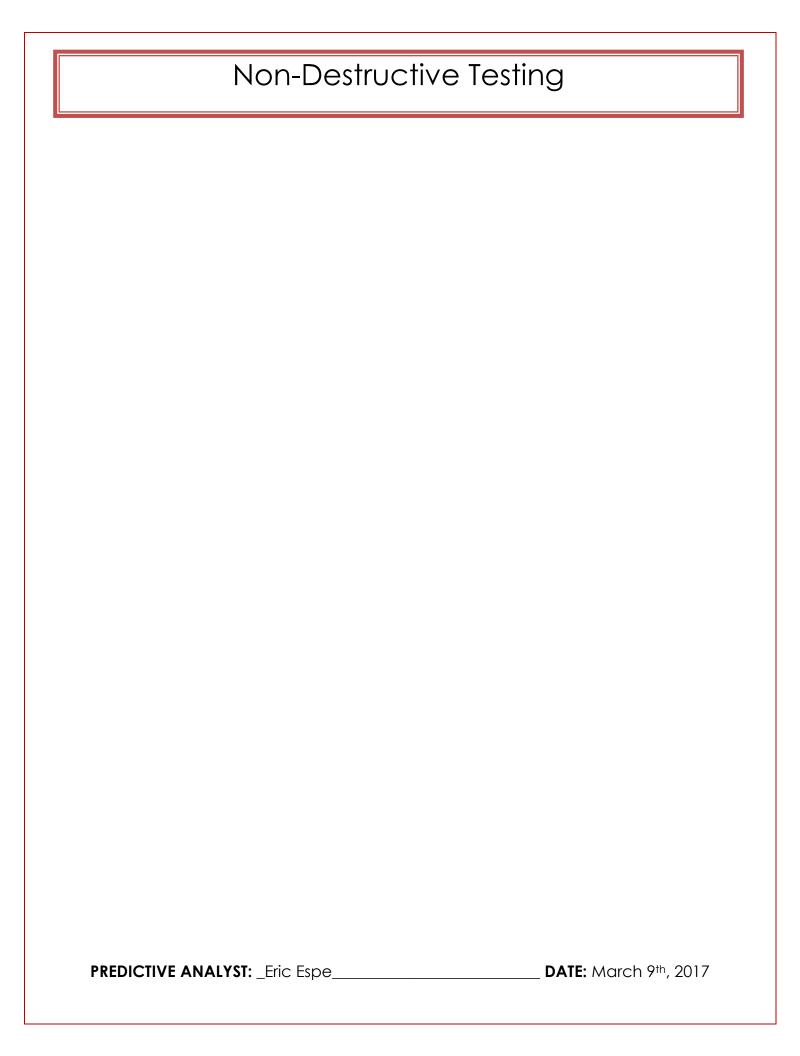
> Gregg Schwartz Sr. Reliability Engineer ISO Category: Level III

Eric Espe

NDT: Quality Assurance Manager

Level I: IR/VIB/PT/PA

Level II UT/VT/MT/ET



# Non-Destructive Testing Procedure



### Predictive Technologies 18827 570<sup>th</sup> Ave Austin, MN. 55912 (507) 438-6703

Document Title:											
Predictive Technologies Inc., No	Page 1 of 1										
Document Type: Procedure	Documen	t Number	Initial Date	Revision	Effective Date						
	QC-1, VT-	1, UT-1,	3/15/2014	1.0	3/15/2014						
	MT-1, PT-	1									
Equipment:		Calibration In	Approve Date								
Olympus EPOCH 600, S#140613	Olympus EPOCH 600, S#140613801										
Transducer: V260-SM, S# 91638	Certificate # 4										
		1/31/2015									

# Miscellaneous Information

### **Action Code Descriptions on Piping Inspection Record**

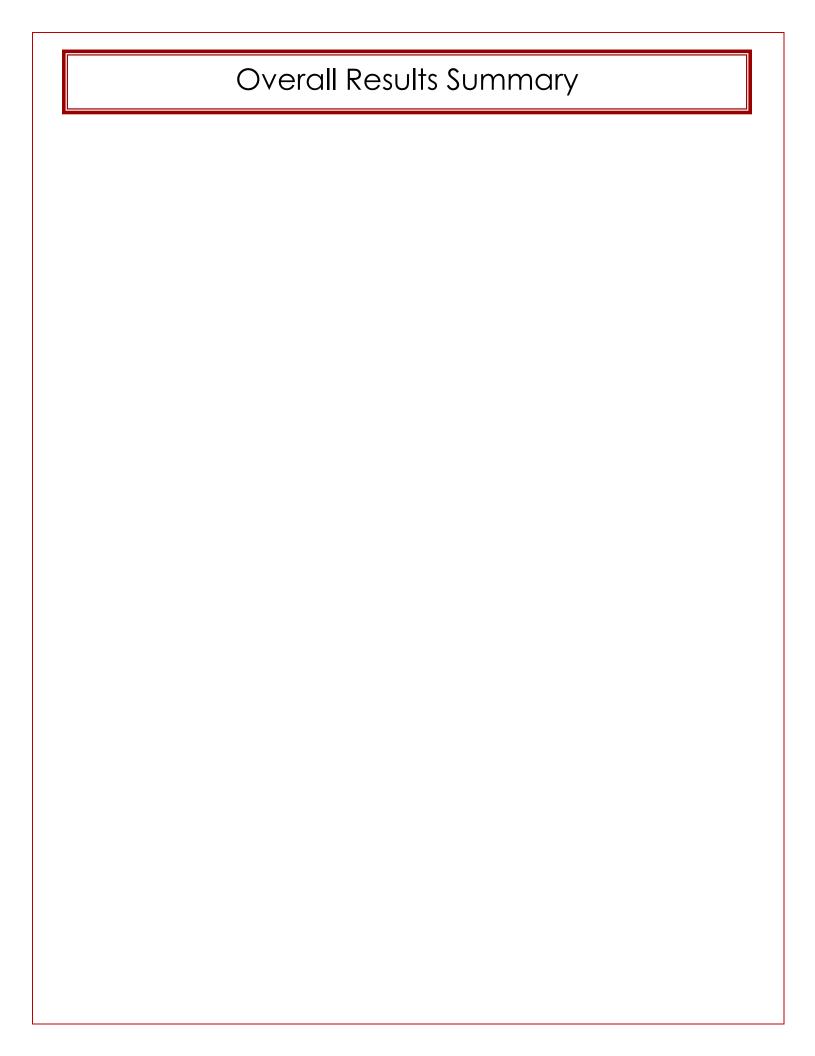
1	Asset Critical – underrated, leaking, welding involved for repair/replacement,
	possible shutdown required (requires individual work order and/or FCR)
2	Non-welded correction action – painting, thread adjustments, supports, chafing,
	etc. (bulk work order)
3	Non-operations deficiencies – engineering, inspections, etc.

### Key to Information Provided Throughout Report

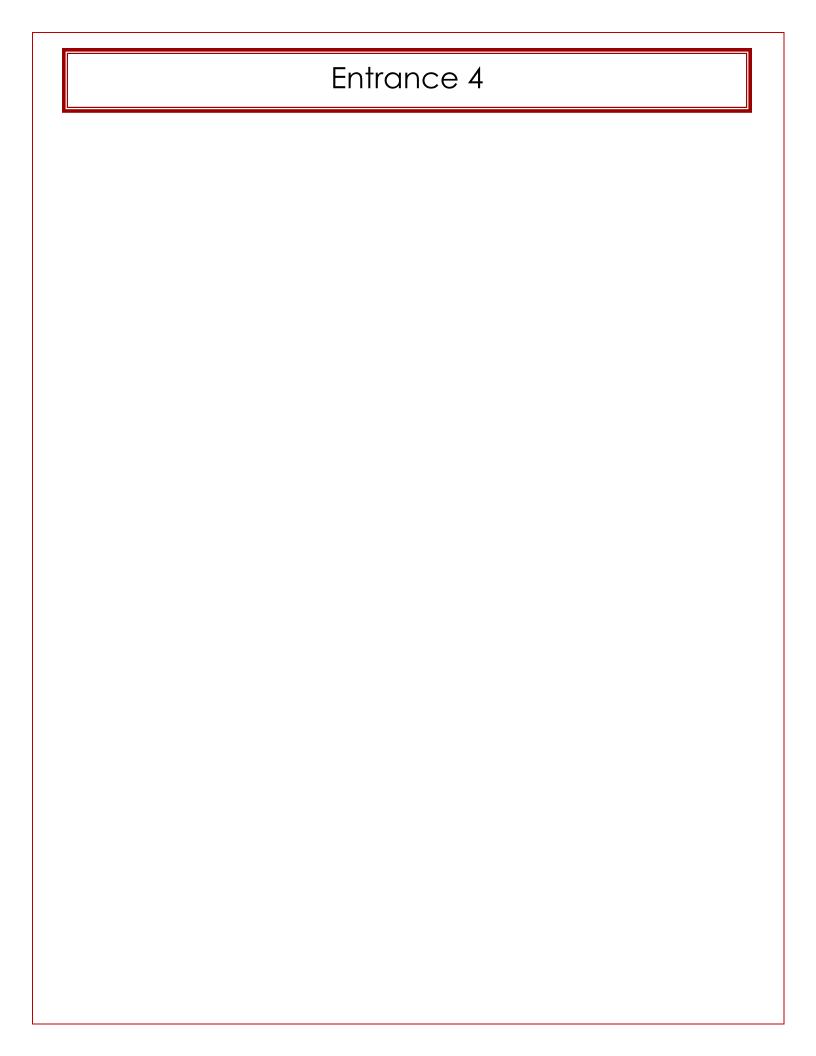
CUI	Corrosion Under Insulation
CML	Condition Monitoring Location
WPB	Wrought Process Base (Type of Material: Grade, Content)
LLC	Light Local Corrosion
LGC	Light General Corrosion
MLC	Moderate Local Corrosion
MGC	Moderate General Corrosion
AUT	Automated Ultrasonic Testing
MFL	Magnetic Flux Leakage
VTU	Visual Testing Unsatisfactory
HAZ	Heat Affected Zone
ERW	Electric Resistance Weld (85% of Seamless Joint Efficiency)
Ingress	An area that moisture can accumulate

### **Key to Certifications**

ET	Eddy Current
IR	Infrared Analysis
MT	Magnetic Particle Examination
PA	Phased Array
PT	Dye Penetrant
UT	Ultrasonic Thickness Testing
VIB	Vibration Analysis
VT	Visual Inspection Testing



			Nominal	Lowest Current	Lifetime Corrsion	Remaining Half life	Next Inspection:	Next Inspection		
on # Date	of Survey	Equipment Tested	Thickness	Thickness	Rate Annually	(yrs)	API510/570	Ultrasonic	Condition	Comments
3/9	/9/2017	(Entrance 4) 1/2" Steam	0.109	0.058	0.011"	2.0	N/A	2018	Alarm	Defiencies Exist: See detailed report.
3/9	/9/2017	(Boiler Room) Pump 2 to Gate Valve	0.154	0.101	0.0106"	3.8	N/A	2018	Alert	Deficiencies Exist: See detailed report.
3/9	/9/2017	(Boiler Room) Pump 4 to Gate Valve	0.154	0.132	0.0044"	12.6	N/A	2018	Acceptable	Deficiencies Exist: See detailed report.
3/	/9/2017	(Boiler Room) 10" Main Header	0.365	0.3	0.013"	9.4	N/A	2018	Acceptable	Deficienciess Exist: See detailed report.
3/	/9/2017	(Boiler Room) Pump 2 / Pump 4 Header	0.365	0.358	0.0014"	107.6	N/A	2018	Acceptable	None Noted at Time of Inspection.
3/	/9/2017	(Boiler Room) Pump 2 & 4 Riser to Header	0.216	0.197	0.0038"	22.0	N/A	2018	Acceptable	None Noted at Time of Inspection.
3/	/9/2017	(Boiler Room) 3" Supply to Pumps 2 & 4	0.216	0.185	0.0062"	12.5	N/A	2018	Acceptable	Deficiencies Exist: See detailed report.
3/	/9/2017	(East AHU) 2" Steam	0.154	0.129	0.005"	10.8	N/A	2018	Acceptable	Deficiencies Exist: See detailed report.
3/9	/9/2017	(East AHU) 3" Steam	0.216	0.190	0.0052"	15.2	N/A	2018	Acceptable	Deficiencies Exist: See detailed report.
3/9	/9/2017	(Little Gym) 1" Steam	0.133	0.126	0.0014"	38.5	N/A	2018	Acceptable	None Noted at Time of Inspection.
3/	/9/2017	(Little Gym) 3" Steam	0.216	0.186	0.006"	13.0	N/A	2018	Acceptable	None Noted at Time of Inspection.
3/9	/9/2017	(Media Center) 1" Steam	0.179	0.162	0.0034"	20.4	N/A	2018	Acceptable	None Noted at Time of Inspection.
3/9	/9/2017	(Media Center) 3" Steam	0.216	0.183	0.0066"	11.5	N/A	2018	Acceptable	None Noted at Time of Inspection.
3/9	/9/2017	(Media Center) 4" Steam	0.237	0.236	0.0002"	507.6	N/A	2018	Acceptable	None Noted at Time of Inspection.
1 3/9	/9/2017	(Classroom 101) 3/4" Steam	0.113	0.107	0.0012"	38.4	N/A	2018	Acceptable	None Noted at Time of Inspection.
2 3/9	/9/2017	(Classroom 102) 3/4" Steam	0.113	0.104	0.0018"	24.7	N/A	2018	Acceptable	Deficiencies Exist: See detailed report.
3/9	/9/2017	(Classroom 201) 3/4" Steam	0.113	0.098	0.0030"	13.8	N/A	2018	Acceptable	None Noted at Time of Inspection.



Facility	Leroy-Ostrande	er	P&ID No. (First & La	ast):	Status A		Inspection	Interval (y	rs)	5	
Line No.	N/A		N/A		Regulated By:			X API		PSM	
Description	Entrance Heater				Insulated	0%		rground			
Location	Entrance 4				Vibration: Previous Failure	Light [	_	Producing,	⅃ ′High Ve	Heavy locity	
Service (Oil, G	Gas, Etc.) Steam	า	Sour Ser	vice $\square$	Dead Leg Air to Ground	L [		tion Point osion Coup	nn .		늗
Fabrication Co			Piping Class (1,2,		Over Water		Anod		JII		⊢
Comments			p8 6.035 (1)2)		Inspection Type:		Full	Parti	al 🗀	7 UT/VT	· 🗖
					Other (Specify)			_		_ ,	
To be comp	leted in the field (T	Γhe followi	ng conditions apply to	o equipment	listed above):						
N/A No area	s of concern noted du	uring physi	cal inspection.								
X External			rface rust, no scaling	or pitting).							
		_	te (pit depth not grea		'light scale).		Pit	Scale			
		Extreme	(pit depth greater the	an C.A./heav	y scale).	Pit	Sc	cale			
N/A Visual Ex	xamination of existing	g welds (se	e comments):			Satis	factory		Uns	atisfactory	,
N/A Non-typ	oical fittings/compone	ents in serv	rice (see comments).		_	<u>-</u>					
N/A Condition	on of insulation:			G	ood	Fair			Poo	٢	
	on of supports/restrai		omments)		_	X Satis	factory		Uns	atisfactory	′
N/A Condition	on of coating (see com	nments):		G	ood	Fair			Poo	ı	
UT II Tech:		Eric Espe					Inspection	Date:	3,	/9/2017	
To be comple	eted in the office:										
N/A RT Perfo	ormed	% R	RT								
	dings Taken.		T Taken	In	accessible	Insul	ated		Not	Required	
NA Other N			Other				(LFET, PT,	MT. Etc.)		ricquirea	
	ss measurements are			sign pressure	requirements		(=: = : / : : /	,,			
N/A Enginee	ring evaluation reque	ested (see o	comments).								
Comments:	Internal Corro	osion Pitting	g/w threaded compo	nents Nomir	nal Thickness 0 109	Remaining 1	Thickness (	0.058			
2.	1. Internal corro	231011 1 1001118	g/ w threaded compo	icitis. Nonini	101 THERHESS 0.103,	iterrianing i	THICKITC33 C	7.030		-	
3.											
4.											
5.											
6.											
7.											
8.											
9. 10.											
10.						Resp.	Govn.			Action	Codo
Action Items						Dept.	By	Mand	Rec	<u>Action</u> <b>1 2</b>	3
1. Monitor	r piping with ultrasoni	ic thickness	s testing. 0.058" rema	ining, minus		Ins	L-O	X	П	пп	X
	hread-cut. Pipe could				ds.			· 🛱	Ħ	ΠH	Ħ
	User to deicide if pipi						-	·	Ħ	ΠĦ	Ħ
threade	d components.		· · · · · · · · · · · · · · · · · · ·				-	·	Ħ	ΠĦ	Ħ
2.	•							· 🛱	Ħ	ПП	Ħ
3.								· 🗇			
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6.											
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8.											
9.											
10.											
10.							_				
Final Review:	:							Review			

FACILITY Leroy-Ostrander School LOCATION En DESCRIPTION En REMARKS (Insp. Method, Equip. Type, Serial No., Etc.)				trance Heater				TECHNICIAN Eric Espe			
DESN.		LOC.				NOM.	12:00	3:00	6:00	9:00	
PRES.	SPEC.		COMP. TYPE Pipe	MATL. <b>A106B</b>		THICK <b>0.113</b>	0.088	0.058	0.113	0.118	
30	IV/A	1	1 ipe	ATOOD	1/2	0.113	0.000	0.030	0.113	0.110	
			_								
Commer	nts:	C	omponents listed a						metry or other	wise not acce	ssible.
				Inre	eaded C	ompone	nts w/ Corros	sion Pitting			
-	•										

Signature UTII Tech. Etic Espe

CODE

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

Facility	Ler	oy-Ostrander	Equip. #	N/A	Insp. Date	3/9/2017				
Location	1938 En	trance 4	Description		Heater					
			Inspection Info	rmation						
Pipe Size			0.5	<b>D</b> = Outside [	Diameter	0.8				
Material			A106B	<b>S</b> = Allowable	e Stress Value	20,000				
Current Inspe	ection Year		2017	P = Design Pr	ressure	30				
Initial or Prev	ious Thickne	ss Reading Year	2012	<b>E</b> = Joint Effic	ciency (seamless E=1)	0.9				
API 570 Inspe	ection Interva	al	5	<b>W</b> = Weld Str	ength Reduction Factor	1.0				
Initial Thickne			0.113	(W=1 unles	s temp. above 800°F)					
Actual Thickn	iess		0.058	Y = Tempera	ture Factor	0.4				
			Calculation Info	ormation						
Minimum Thickness Calculation:										
		DD.	20	v 0.94	25.2					
	t =	2(SF+PY)	$=\frac{30}{2 \times ((-20.000))}$	x 0.9 )+( 30	$\frac{25.2}{(x \ 0.4)} = \frac{25.2}{34,024}$	<del></del>				
		2(32.111)	2 % (( 20,000	x 0.5 /.( 50	X 0.4 // 54,024					
	t =	Required Minim	um Thickness =	0.0147						
Based on the pressure.	above calcu	ılation, this pipe ı	neets the required min	numum thickness fo	or continued service at	the current				
st = Structural Minimum Thickness = 0.0900 Structural minimum thickness based on carbon pipe  THIS PIPE DOES NOT MEET THE STRUCTURAL MINIMUM THICKNESS FOR CONTINUED SERVICE.										
	te: nitial - t-actu veen t-initial	al & t-actual =	0.1130 - 0.0580 5	- = <u>0.0550</u> 5	= 0.0110 Inches Pe	er Year				
Remaining Ha	alf Life:									
			$\frac{0.0147}{10}$ / 2 = $\frac{0.043}{0.013}$		2 = 2.0 Years Remarks	aining Half Life				
Comments										
_										
		Enic Ena	10			3/9/2017				

VT/UT II Tech. Signature

Date

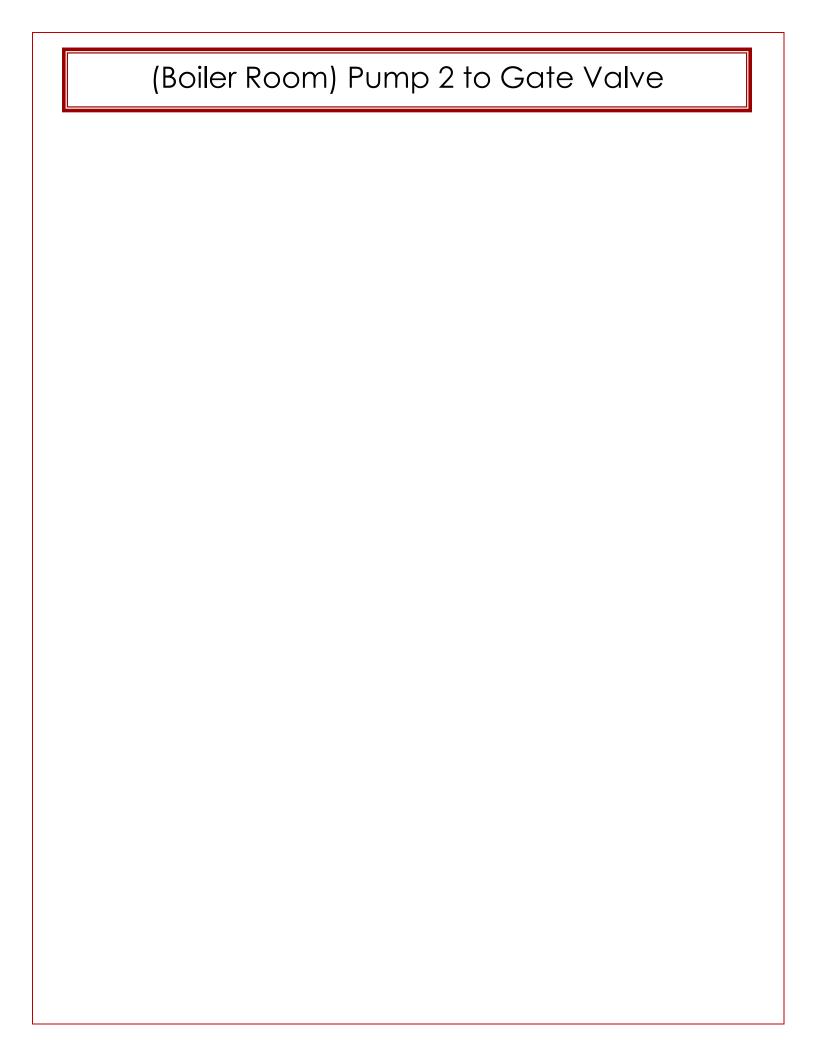
# Entrance 4



Nominal 0.109 Remaining Metal 0.058



Corrosion and Pitting



Facility Leroy-Ostrander Line No. N/A N/A  Description Pump 2 to Gate Valve  Location Boiler Room  Service (Oil, Gas, Etc.) Steam Sour Service Fabrication Code B 31.1 Piping Class (1,2,3, Comments	ce	Regulated By: Insulated Vibration: Previous Failure Dead Leg Air to Ground Over Water Inspection Type: Other (Specify)	0%	X Mode Sand I Injecti	API ground rate  Producing/F on Point sion Coupor	PSM Heavy IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
To be completed in the field (The following conditions apply to e	equipment lis	ted above):				
N/A No areas of concern noted during physical inspection.  X External Corrosion:  X Light (surface rust, no scaling or Moderate (pit depth not greate Extreme (pit depth greater than N/A Visual Examination of existing welds (see comments):  N/A Non-typical fittings/components in service (see comments).  N/A Condition of insulation:  X Condition of supports/restraints (see comments)  N/A Condition of coating (see comments):  UT II Tech:  Exic Espe	r pitting). r than C.A./lig	ght scale). cale).  d	Pit Satis Fair X Satis Fair	Pit Scanners Scanner Scanners Scanners Scanners Scanners Scanners Scanners Scanners		Unsatisfactory Poor Unsatisfactory Poor 3/9/2017
To be completed in the office:						
N/A RT Performed.	gn pressure re e per B31.1, I ess 0.154, Re	out has potential for maining Thickness	or leak due s	to thread cu	ut.	Not Required
6.						
7. 8. 9. 10.						
			Resp.	Govn.		Action Code
Action Items  1. Monitor piping with ultrasonic thickness testing. 0.101" remain			Dept. Maint.	By L-O	Mand	Rec 1 2 3
<ol> <li>0.070" thread-cut could potentially have 0.031" remaining met</li> <li>Remove scale. Seal Coat w/ Devoe 235 or 236 for Carbon Steel</li> </ol>		us.	Maint.	L-O	H	
Monitor with Ultrasonic Thickness Testing.			Ins.	L-O		
4. Monitor with Ultrasonic Thickness Testing and or replace.			Maint.	L-O	i d	
5. 6. 7. 8. 9.						
Final Review:  Authorized UTII Tech: Exic Espe					eview Date:	3/24/2016

							(inches)				
									;	SHEET 1	of <u>1</u>
FACILITY	<b>′</b>		Leroy-Ostrander	School		LIN	E NO.	N/A	INSPECTION	3-9-17	
LOCATIO					er Roo					ATION	None
DESCRI	PTION				2 to G	ate Valve	2		TECHNICIAN	Eric	c Espe
REMARK	(S (Insp.		Equip. Type, Serial N					lus - S/N 12040			
		,		,,		, 11, Olj.	inpus co BE 1	145 B/1 (12010	o oc, I unumen	105 27 70 157	11702101
	F	1.00	T	ī	ı	NOM.	10.00	2.22	0.00	0.00	1
DESN.	0050	LOC. NO.	COMP TYPE		SIZE	THICK	12:00	3:00	6:00	9:00	1
PRES.	SPEC.	1	COMP. TYPE CTN	MATL. <b>A105</b>	2"	-	N/A	N/A	N/A	N/A	
30	N/A N/A	2	90	CS	2"	0.250	IN/A	IN/A	0.248	IN/A	
30	N/A	3	Pipe	A106B	2''	0.250	0.144	-	0.148	-	+
30	N/A	4	CTN	A100B	2''	-	N/A	N/A	N/A	N/A	
30	N/A	5	90	CS	2''	0.250	0.260	-	-	-	-
30	N/A	6	Pipe	A106B	2''	0.154	0.168	0.150	0.157	0.153	
30	N/A	7	Pipe	A106B	2''	0.154	0.148	-	0.146	-	
30	N/A	8	Pipe	A106B	2''	0.154	0.153	0.156	0.157	0.158	
30	N/A	9	45	CS	2''	-	-	-	0.197	-	
30	N/A	10	Pipe	A106B	2''	0.154	0.146	0.143	0.152	0.150	
30	N/A	11	45	CS	2''	-	0.188	-	-	-	
30	N/A	12	Pipe	A106B	2''	0.154	0.136	0.142	0.132	0.137	
30	N/A	13	CTN	A105	2''	-	NA	NA	NA	NA	
										<b></b>	
										<u> </u>	
			l e e e e e e e e e e e e e e e e e e e	1	I	Ī l			1	1	1

Comments: Components listed as "N/A" at heights, covered, contain excessive part geometry or otherwise not accessible.

All piping components threaded

Light general external corrosion due to areas of ingress/condensation

Signature UTII Tech. Exic Espe

CODE **B31.1** 

B31.1

B31.1

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility ocation	Leroy-Ostrander Boiler Room	Equip. # _ Description	N/A Pun	Insp. Date	3/9/2017
		<u> </u>			
		Inspection Info			
Pipe Size		2	<b>D</b> = Outside D		2.4
Material		A106B	<b>S</b> = Allowable	Stress Value	20,000
Current Insp	ection Year	2017	P = Design Pre	essure	30
Initial or Pre	vious Thickness Reading Year	2012	<b>E</b> = Joint Effici	ency (seamless E=1)	0.9
API 570 Insp	ection Interval	5	<b>W</b> = Weld Stre	ngth Reduction Factor	1.0
Initial Thickn		0.154		temp. above 800°F)	
Actual Thick		0.132	Y = Temperat		0.4
		Calculation Inf	-		
Minimum Th	nickness Calculation:	Calculation	ormation		
	$t = \frac{PD}{2(SE+DV)}$	$= \frac{30}{2 \times ((20,000))}$	X 2.375	$\frac{1}{\sqrt{0.4 \text{ N}}} = \frac{71.25}{34.024}$	<del></del>
	2(31+1)	2 X (( 20,000	) X 0.9 )+( 30 /	34,024	
	t = Required Mini	mum Thickness =	0.0211		
Based on th pressure.	e above calculation, this pipe	e meets the required mi	inumum thickness fo	r continued service at	the current
This pipe m		nimum Thickness = _ im thickness based on c Minimum Thickness fo	arbon pipe		
Corrosion Ra	ate:				
• :	initial tactual	0.1540 0.1330	0.0220		
years bety	initial - t-actual ween t-initial & t-actual	= \frac{0.1340 - 0.1320}{5}	$\frac{5}{100} = \frac{0.0220}{5}$	= 0.0044 Inches Po	er Year
Remaining H	lalf Life:				
t-actual - t- Corrosio	minimum / 2 = 0.1320 - 0.0 on Rate	$\frac{0.0211}{044}$ / 2 = $\frac{0.11}{0.00}$	1.09 1.09 1.44 ÷ 2 = 25.2 /	2 = 12.6 Years Rema	aining Half Life
Based	on the above corrosion rate	and half life calculation	n, this pipe is due for	inspection: Man	r 2022
Comments					
	Eric E			1	10/31/2016
	VT/UT II Tech	. Signature			Date

# (Boiler Room) Pump 2 to Gate Valve



Forging Imperfection at Location 4



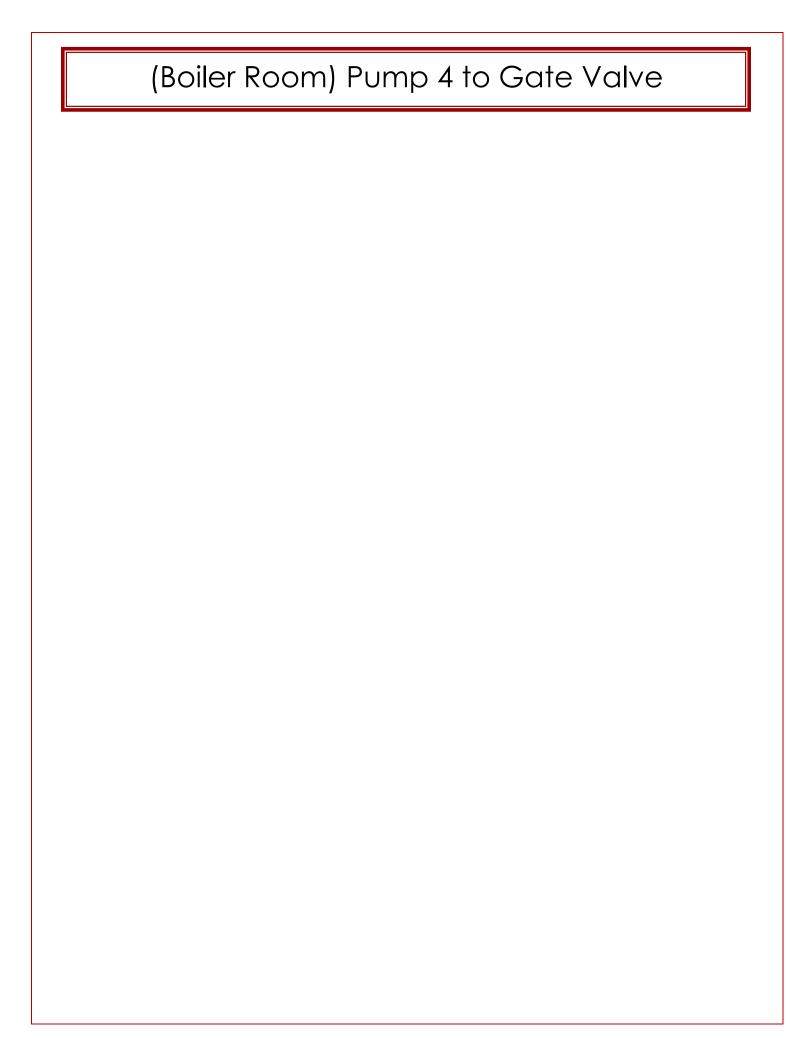
Close Threaded Nipples/Threaded Fittings



Forging Imperfection at Location 4



Light General Corrosion



Facility Line No.	Leroy-Ostrander N/A	P&ID No. (First & Last	):	Status A Regulated By:	001	Inspection Inte	API	5 PSM
Description	Pump 4 to Gate Vavle			Insulated	0%	Undergro		
Location	Boiler Room			Vibration: Previous Failure Dead Leg	Light	Moderate Sand Proc Injection I	lucing/Hig	Heavy 📙 h Velocity 🔲
Service (Oil, G Fabrication Co Comments		Sour Servic Piping Class (1,2,3,4		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Anodes Full		
To be compl	eted in the field (The follo	wing conditions apply to e	quipment lis	ted above):				
N/A Visual Ex N/A Non-typi N/A Condition X Condition	Mode	(surface rust, no scaling or crate (pit depth not greater me (pit depth greater than (see comments): ervice (see comments).	than C.A./lig	d	Fair	Scale sfactory	<u> </u>	Unsatisfactory Poor Unsatisfactory Poor
UT II Tech:	Eric Es	pe				Inspection Dat	e:	3/9/2017
N/A Engineer Comments:	DE. s measurements are less that ing evaluation requested (se			equirements		ılated e (LFET, PT, MT,		Not Required
3.								
4.								
5.								
6.								
7. 8.								
9.								
10. Action Items					Resp. Dept.	Govn. By Ma	ınd Re	Action Code 1 2 3
	scale. Seal Coat w/ Devoe 2	35 or 236 for Carbon Steel			Maint.	L-O		
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10.							j 🗇	
Final Review:						Revie	<u>—</u> ew	<u></u>
Authorized U	TII Tech: Eric Espe					Date		10/31/2016

									OUEET 1 .	1	
EACII IT	<b>v</b>		I arov-Ostrandar	School		LIN	E NO	N/A		SHEET 1 C	
LOCATI	'		Lerby-Ostranuer	Poil	or Door	LIIV		IV/A	INSPECTION DATE  PAINT/INSULATION  None		
DECOR	ON			DOIL	4 4 C	4 37 1			TEOLINIO AN	ATION	None
									TECHNICIAN		
REMAR	KS (Insp.	Method,	Equip. Type, Serial No	o., Etc.)	U	TT, Oly	mpus 38 DL P	lus - S/N 12040	6903, Panametr	ics D790 - S/I	N 902401
DESN.		LOC.				NOM.	12:00	3:00	6:00	9:00	
	SPEC.		COMP. TYPE	MATL.	SIZE	THICK		•	•	•	•
30	N/A	1	Pipe	A106B	2''	0.148	0.138	0.134	0.140	<u> </u>	
30	N/A	2	90	CS	2''	0.250	-	-	0.246	-	
30	N/A	3	Pipe	A106B	2''		0.141	-	0.137	0.14	
30	N/A	4	90	CS	2''	0.218	0.193	-	-	-	
30	N/A	5	Pipe	A106B	2''	0.154	0.141	-	0.136	0.14	
30	N/A	6	Pipe	A106B	2''	0.154	0.146	0.146	0.146	0.138	
30	N/A	7	Pipe	A106B	2''	0.154	0.144	-	0.101	-	C,P
30	N/A	8	45 CTD	CS	2''		-	-	0.147	-	
30	N/A	9	CTN	A105		- 0.154	N/A	N/A	N/A	N/A	
30	N/A	10	45 CTN	CS	2''	0.154	0.147	- N/A	- N/A	-	
30	N/A N/A	11 12	CTN	A105 A106B	2"	0.154	N/A 0.148	N/A	N/A	N/A	
30	IN/A	14	Pipe	A100D		0.154	0.146	<del>-</del>	<del>-</del>	<del>                                     </del>	
									1	<del>                                     </del>	
+										<u> </u>	
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<u>l</u>											
			4 12 4 1							<u> </u>	

Comments: Components listed as "N/A" at heights, covered, contain excessive part geometry or otherwise not accessible.											
Internal Corrosion/Pitting Noted											
All piping components threaded											
Light general external corrosion											
Signature UTII Tech. Exic Espe											

CODE **B31.1** 

B31.1 B31.1 B31.1 B31.1 B31.1 B31.1 B31.1

B31.1

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Leroy-Ostrander	Equip. #	N/A	Insp. Date	3/9/2017
cation	Boiler Room	Description		o Gate Valve	
		Inspection Info	rmation		
Dina Ciza		2	<b>D</b> = Outside Diamet	O.W.	2.4
Pipe Size				_	2.4
Material	ation Wash	A106B	S = Allowable Stres		20,000
Current Inspec		2017	P = Design Pressure		30
	ious Thickness Reading Year	2012	<b>E</b> = Joint Efficiency		0.9
API 570 Inspec		5	<b>W</b> = Weld Strength F		1.0
Initial Thickne		0.154	(W=1 unless temp. o		
Actual Thickne	ess	0.101	<b>Y</b> = Temperature Fa	actor	0.4
		Calculation Info	ormation		
Minimum Thi	ickness Calculation:				
	$t = \frac{PD}{2(SE+PY)}$	30	x 2.375 x 0.9 )+( 30 x 0.4	71.25	-+ 0.019
	$t = {2(SE+PY)}$	2 x (( 20,000	x 0.9 )+( 30 x 0.4	34,024	-+ 0.019
	t = Required Minim	num Thickness =	0.0211		
	above calculation, this pipe	meets the required min	numum thickness for cont	tinued service at th	e current
pressure.					
Pressurer					
Pressurer					
Prossure.	st = Structural Min	imum Thickness     =	0.1000		
Prossure		imum Thickness			
	Structural minimui	m thickness based on co	arbon pipe		
		m thickness based on co	arbon pipe		
	Structural minimules the required Structural I	m thickness based on co	arbon pipe		
This pipe mee	Structural minimules the required Structural I	m thickness based on co	arbon pipe		
This pipe mee	Structural minimules the required Structural I	m thickness based on co	r continued service.	0.010C Jackes Day	Vana
This pipe mee Corrosion Rat t-in	Structural minimulets the required Structural Mate:	m thickness based on co	r continued service.	0.0106 Inches Per	Year
This pipe mee Corrosion Rat t-in	Structural minimulets the required Structural Partie:  hitial - t-actual	m thickness based on co	r continued service.	0.0106 Inches Per	Year
This pipe mee Corrosion Rat t-in years betwee	ets the required Structural Material   te:  hitial - t-actual   een t-initial & t-actual	m thickness based on co	r continued service.	0.0106 Inches Per	Year
This pipe mee Corrosion Rat t-in years betwee Remaining Ha	Structural minimumets the required Structural Mate:  nitial - t-actual een t-initial & t-actual alf Life:	m thickness based on co	r continued service.	0.0106 Inches Per	Year
This pipe mee Corrosion Rat t-in years betwee Remaining Ha	Structural minimumets the required Structural Mate:  nitial - t-actual een t-initial & t-actual alf Life:	m thickness based on co	r continued service.  = = \frac{0.0530}{5} =		
This pipe mee Corrosion Rat t-in years betwee Remaining Ha	Structural minimumets the required Structural Mate:  nitial - t-actual een t-initial & t-actual alf Life:	m thickness based on co	r continued service.		
This pipe mee Corrosion Rat t-in years betwee Remaining Ha t-actual - t-m	Structural minimumets the required Structural Mate:  nitial - t-actual een t-initial & t-actual alf Life:	m thickness based on co	r continued service.  = = \frac{0.0530}{5} =		
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha  t-actual - t-m Corrosion	Structural minimumets the required Structural Mate:  nitial - t-actual een t-initial & t-actual alf Life:	m thickness based on communation of the communation of the communation of the community of	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion	structural minimum  te:  hitial - t-actual een t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1010 - 0.01	m thickness based on communation of the communation of the communation of the community of	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	structural minimum  te:  hitial - t-actual een t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha  t-actual - t-m Corrosion	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remain	ning Half Life
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha t-actual - t-m Corrosion  Based of	ets the required Structural Mate:  hitial - t-actual een t-initial & t-actual  alf Life:  hinimum / 2 = 0.1010 - 0.01  harace / 2 = 0.1010 - 0.01	Minimum Thickness for $ \frac{0.1540 - 0.1010}{5} $ $ \frac{0.0211}{106} / 2 = \frac{0.079}{0.010} $ and half life calculation	arbon pipe  r continued service. $\frac{0.0530}{5} = \frac{0.0530}{5} \div 2 = 7.5 / 2 = \frac{0.0530}{5}$	3.8 Years Remainection: Dec 20	ning Half Life

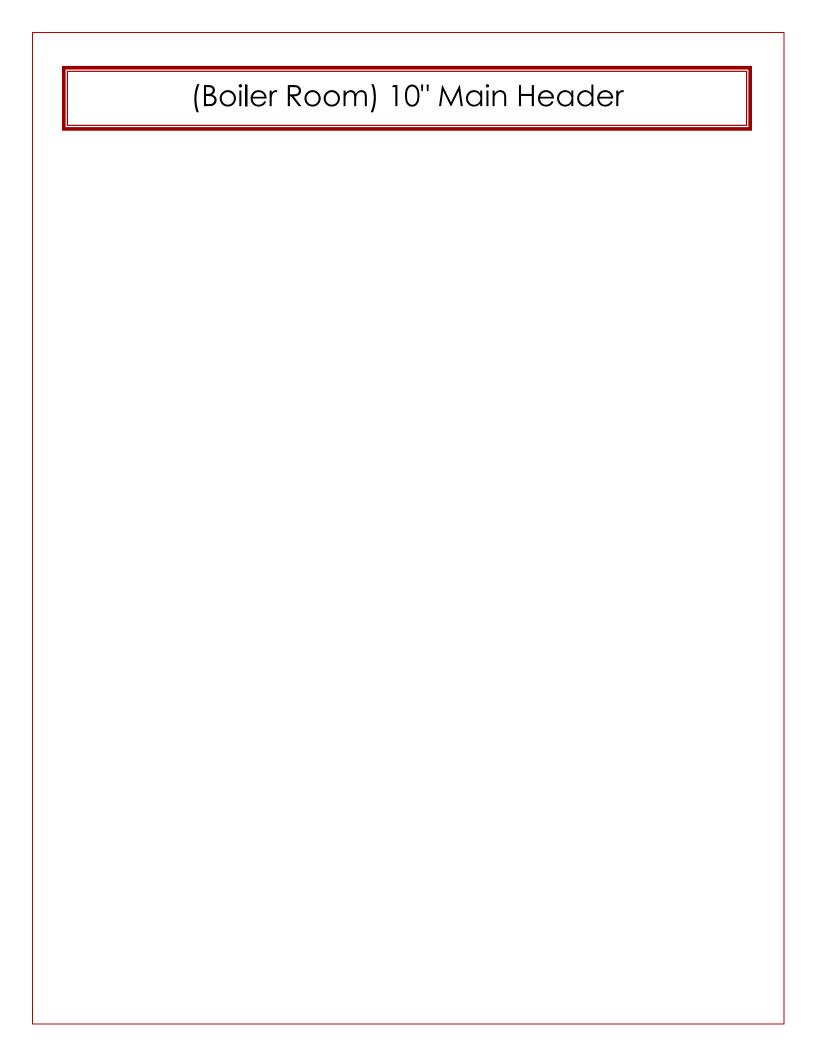
# (Boiler Room) Pump 4 to Gate Valve



Light General Corrosion



Close Threaded Nipple (CTN)



Facility Leroy-Ostran Line No. N/A Description 10 " Boiler Mai	N/A	st):	Status A Regulated By: Insulated		spection Interval ( vner X API Underground	yrs) 5 PSM
Location Boiler Room			Vibration: Previous Failure Dead Leg	Light X	Moderate [ Sand Producing Injection Point	_
Service (Oil, Gas, Etc.) Ster Fabrication Code Comments	am Sour Serv 3 31.1 Piping Class (1,2,3	ш	Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Coup Anodes Full  Par	
To be completed in the field	(The following conditions apply to	equipment lis	sted above):			
N/A No areas of concern noted X External Corrosion:  N/A Visual Examination of exist  N/A Non-typical fittings/compo X Condition of insulation: X Condition of supports/rest  N/A Condition of coating (see co	Light (surface rust, no scaling of X Moderate (pit depth not greate Extreme (pit depth greater thating welds (see comments): nents in service (see comments).	er than C.A./li	od	X Pit Pit Satisfac Fair X Satisfac Fair	Scale ctory	Unsatisfactory  X Poor Unsatisfactory Poor
UT II Tech:	Eric Espe			Ins	spection Date:	3/9/2017
N/A Engineering evaluation requirements: 1. Light general 2. External pitting/scale on each state of the stat	al external corrosion throughout and cap (Loc.1)	gn pressure r			FET, PT, MT, Etc.)	Not Required
8. 9.						
10. Action Items				Resp. Dept.	Govn. By Mand	Action Code Rec 1 2 3
<ol> <li>Remove insulation, buff sc.</li> <li>Repair leaking valve/flange</li> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> <li>10.</li> </ol>	ale. Seal Coat w/ Devoe 235 or 236 ale. Seal Coat w/ Devoe 235 or 236			Maint. Maint.	L-O	
Final Review:  Authorized UTII Tech: Exic Ex	ре	_			Review Date:	3/24/2016

	outer 1 / 1													
	EACH ITS	.,		Lanar Oatmandan	Cahaal		1.181	E NO	NT/A		SHEET 1			
	LOCATIO			Leroy-Ostrander	SCHOOL Desi	an Daar	LIIN	E NO	IN/A	DAINT/INCLU	ATION	3-9-17		
	LOCATIC	ИС			Boll	er Koo	<u>m</u>			PAINT/INSUL	ATION	None		
	DESCRI	TION			10 D0	ner wi	ler Main Header TECHNICIAN Eric Espe UTT, Olympus 38 DL Plus - S/N 120406903, Panametrics D790 - S/N 902401							
	REMARK	(S (Insp.	Method,	Equip. Type, Serial No	o., Etc.)	U	TT, Oly	mpus 38 DL Pl	lus - S/N 12040	6903, Panametr	<u>ics D790 - S/</u>	N 902401		
1	DEON		LOC.				NOM.	12:00	3:00	6:00	9:00	T		
	DESN. PRES.	SDEC		COMP. TYPE	MATL.	SIZE	THICK	12.00	3.00	6.00	9.00	1		
	30	N/A	1	End Cap	A53B	10"		-	-	0.378	_			
	30	N/A	2	Pipe	A53B	10"		-	0.313	0.312	<del> </del> -			
	30	N/A	3	Pipe	A53B	10"		-	0.312	0.311	_			
	30	N/A	3.1	Branch	A106B	2''	0.154	0.156	0.154	-	-			
	30	N/A	3.2	Branch	A106B	6''	0.280	NA	0.247	N/A	N/A			
	30	N/A	3.3	Branch	A106B	6''	0.280	N/A	0.230	N/A	N/A			
	30	N/A	3.4	Branch	A106B	2''	0.154	0.168	0.155	0.171	0.164			
	30	N/A	3.5	Branch	A106B	6''	0.154	N/A	N/A	0.235	N/A			
	30	N/A	3.6	Branch	A106B	6''	-	0.272	0.274	0.267	0.27			
	30	N/A	4	Pipe	A53B	10"	0.365	0.318	0.300	0.312	0.316			
	30	N/A	4.1	Branch	A106B	6''	- 0.154	N/A	N/A	N/A	N/A			
_	30	N/A N/A	4.2 5	Branch Tee	A106B A53B	4'' 10''	0.154	N/A	N/A	N/A 0.370	N/A			
4	30	N/A	5.1	Pipe	A106B	6''	0.375	-	+ -	0.370	<del></del>			
	30	N/A	5.2	Pipe	A106B	2''	0.280	0.151	<del>-</del>	0.203	0.157			
	30	N/A	6	End Cap	A53B	10"	0.134	-	<del>-</del>	0.367	-			
		11/11	Ü	пи сир	ПССБ	10	0.070			0.007	1			
											<u> </u>			
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1		1					<del>                                     </del>				<del>                                     </del>	+		
	Commer	nts:	ſ	omponents listed a	s ''N/A'' a	t heigh	ts. cover	ed, contain evo	ressive nart geo	metry or others	vise not acce	ssible.		
٠								external corros		,y oviivi				
							O							

Signature UTII Tech. Eric Espe

QC Form-Thickness Measurement (Piping)

CODE

B31.1

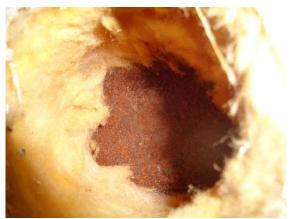
Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

Facility	Leroy-Ostrander	Equip. #		Insp. Date	3/9/2017
Location	Boiler Room	Description	10	" Main Header	
Pipe Size Material Current Inspection Initial or Previous API 570 Inspection Initial Thickne Actual Thickne	ction Year Ous Thickness Reading Year ction Interval ss	Inspection Inform	D = Outside Dia S = Allowable S P = Design Pres E = Joint Efficie W = Weld Stren (W=1 unless te Y = Temperatu	ameter Stress Value ssure ency (seamless E=1) gth Reduction Factor emp. above 800°F)	10.8 16,000 30 0.9 1.0
	$t = \frac{PD}{2(SE+PY)}$ $t = Required Minim$	$= \frac{30}{2 \times (( 16,000 \times 10^{-2}))}$ $= \frac{30}{2 \times (( 16,000 \times 10^{-2}))}$ $= \frac{30}{2 \times (( 16,000 \times 10^{-2}))}$		(0.4 )) = 322.5 27,224	— +    0.045
This pipe mee Corrosion Rat  t-in years betwee Remaining Ha  t-actual - t-m Corrosion	Structural minimum  ets the required Structural Note:  iitial - t-actual een t-initial & t-actual  olf Life:	mum Thickness =	0.1000 on pipe  ontinued service.  = \frac{0.0650}{5} = \frac{0.0650}	0.0130 Inches Per	r Year ining Half Life
	Eric Esy VT/UT II Tech.			10	0/31/2016 Date

# (Boiler Room) 10" Main Header



Leaking Valve at Loc. 4.1 (CUI



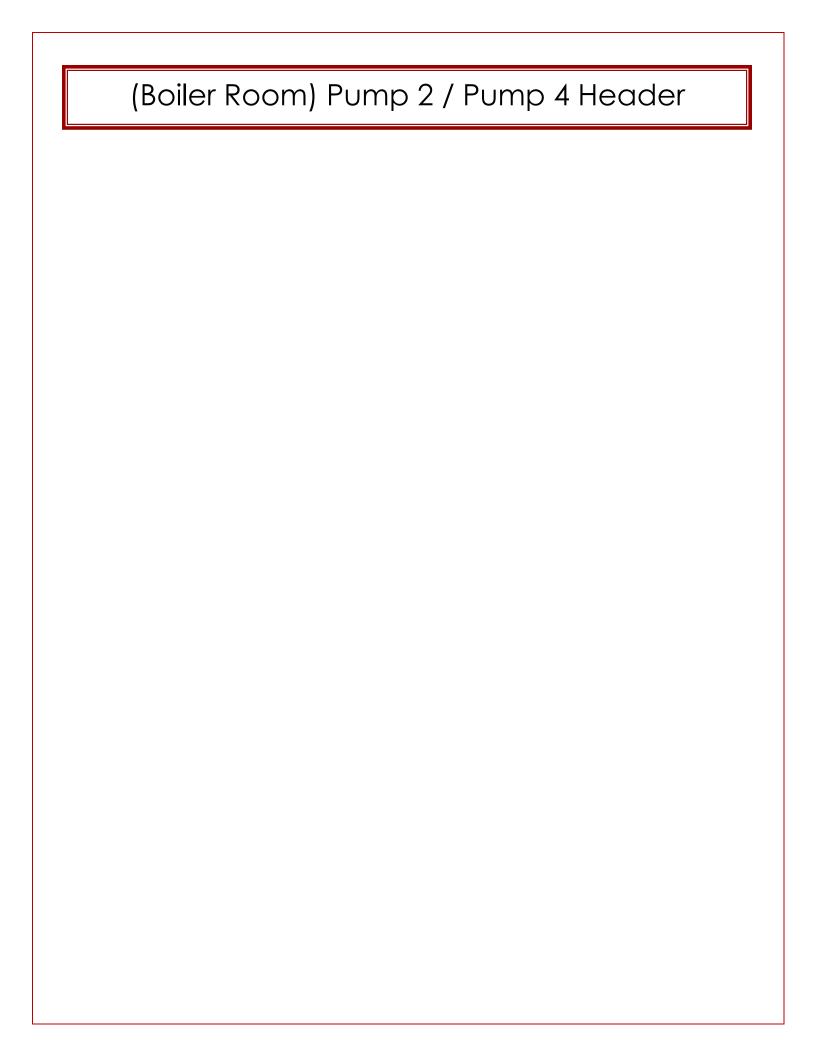
End Cap Showing Light General w/Pitting



Testing Branch Connections on Header



Support Hangers Under Insulation (LGC)



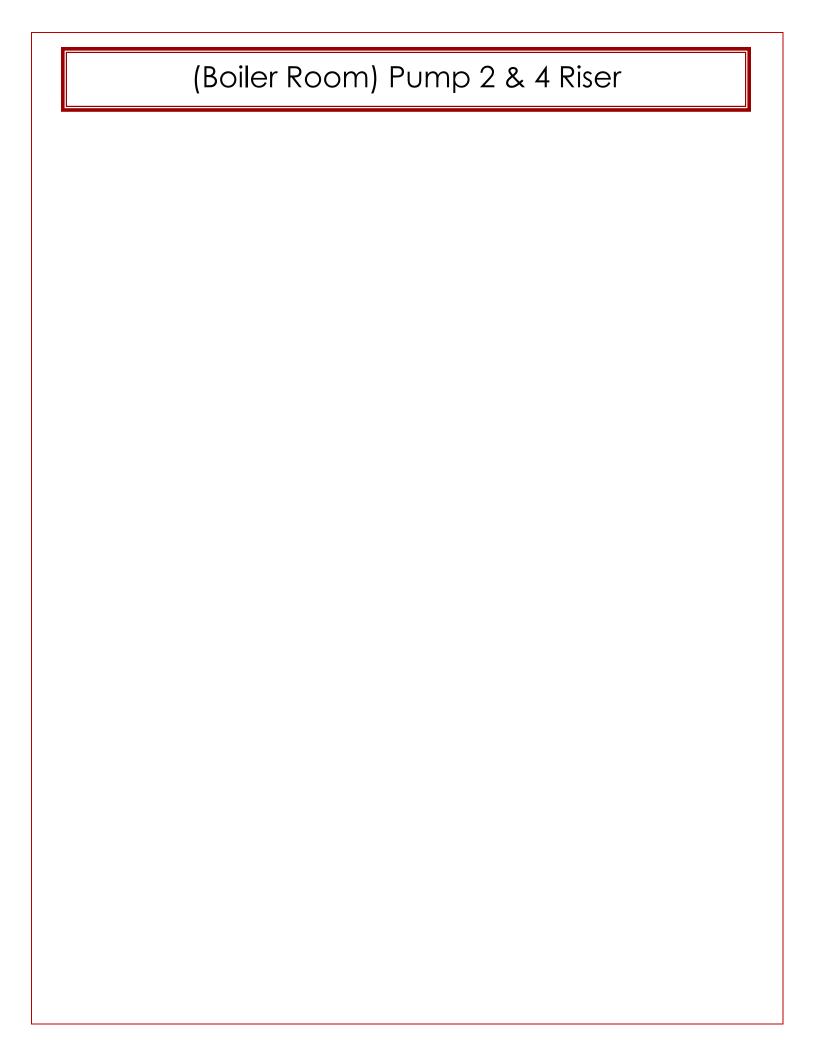
Facility Lero Line No.  Description P2/P4 H	y-Ostrander N/A Header	P&ID No. (First & Las N/A	t):	Status A Regulated By: Insulated		nspection Interval Owner X API Underground	
Location Boiler F				Vibration: Previous Failure Dead Leg	Light Z	Moderate	Heavy D
Service (Oil, Gas, Etc.) Fabrication Code Comments	Steam B 31.1	Sour Servi Piping Class (1,2,3		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Cou Anodes Full Pa	pon
To be completed in t	he field (The follow	ing conditions apply to	equipment lis	sted above):			
N/A No areas of conce X External Corrosion  N/A Visual Examination  N/A Non-typical fitting X Condition of insula X Condition of suppo  N/A Condition of coati	rn noted during physic    X Light (su   Modera   Extrement of existing welds (so   so/components in seriation:   orts/restraints (see co	ical inspection.  urface rust, no scaling o  te (pit depth not greate e (pit depth greater than ee comments):  vice (see comments).	r pitting). er than C.A./li	ght scale). scale).  od	Pit Satisfa Fair X Satisfa Fair		Unsatisfactory  X Poor Unsatisfactory Poor
UT II Tech:	Eric Espe	:		_	 Ir	nspection Date:	3/9/2017
N/A RT Performed.  x UT Readings Taker  NA Other NDE.  N/A Thickness measur  N/A Engineering evaluation  Comments: 1. No  2.	% ements are less than	UT Taken Other minimum to meet desi <sub>l</sub> comments).		ccessible equirements	Insula Type (	ted LFET, PT, MT, Etc.)	Not Required
3.							
4. 5. 6. 7. 8. 9. 10.							
-					Resp.	Govn.	Action Code
1. 2. 3. 4. 5. 6. 7. 8. 9.					Dept.	By Mand	Rec 1 2 3
Final Review: Authorized UTII Tech:	Eric Espe					Review Date:	3/24/2016

											of1
FACILIT	Υ		Leroy-Ostrander	School		LIN	E NO	N/A	INSPECTION	I DATE	3-9-17
LOCATI	ON			Boil	ler Roo	m			INSPECTION DATE 3-9-17 PAINT/INSULATION None		
REMAR	PTION KS (Insp	Method	Equip. Type, Serial N	n Etc.)	2/P4 H	eager ITT Olvi	mnus 38 DL I	Plus - S/N 12040	TECHNICIAN	rics D790 - S	C ESPE /N 902401
11211111111	(mop.	mouriou,	Equip. Typo, Conarra	o., Eto.)		711, Oly	inpus 50 DL 1	1103 - 5/11 12040	ooo, ranamet	11C3 D170 - D	711 702401
DESN.		LOC.				NOM.	12:00	3:00	6:00	9:00	
PRES.	PRES. SPEC. NO. COMP. TYPE MATL. SIZE THICK										
30	N/A	1	Pipe	A53B	10	0.365	-	0.361	0.358	-	
-										+	
-	1							+		+	
	1									+	
	1									+	
										1	
	<u> </u>									<del> </del>	
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Co	4			~ !!N!/A !!	4 h -! -!	40.0	ad asset-!				agible
Comme	nts:	C	omponents listed a	is "N/A" a	at neigh	ts, cover	ea, contain ex	ccessive part geo	ometry or other	wise not acce	essible.
	Signature UTII Tech. Exic Espe										

CODE

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility ocation	Leroy-Ostrander Boiler Room	Equip. #	N/A	Insp. DateP2/P4 Header	3/9/2017
	Boner Room	<del>-</del>		12/1   Header	
Pipe Size		Inspection Info	rmation D = Outside D	iameter	10.8
Material		A53 Gr B	<b>S</b> = Allowable	Stress Value	16,000
Current Insp	oection Year	2017	P = Design Pro	essure	30
Initial or Pre	evious Thickness Reading Year	2012	<b>E</b> = Joint Effic	iency (seamless E=1)	0.9
API 570 Insp	pection Interval	5	<b>W</b> = Weld Stre	ngth Reduction Factor	1.0
Initial Thickr	ness	0.365	(W=1 unless	temp. above 800°F)	
Actual Thick	iness	0.358	<b>Y</b> = Temperat	ure Factor	0.4
		Calculation Info	rmation		
Minimum T	hickness Calculation:	calculation in a	· · · · · · · · · · · · · · · · · · ·		
	t = PD	= 30 2 x (( 16,000	x 10.75	322.5	— +    0.045
	2(SE+PY)	2 x (( 16,000	x 0.9 )+( 30	x 0.4 )) 27,224	. 0.043
	t = Required Mini	mum Thickness =	0.0568		
Based on the pressure.	ne above calculation, this pip	e meets the required mir	numum thickness fo	r continued service at	the current
This pipe m		nimum Thickness = _ um thickness based on ca Minimum Thickness for	rbon pipe		
Corrosion R	ate:				
	initial tractual	0.2650 0.2590	0.0070		
voors hot	-initial - t-actual ween t-initial & t-actual	= 0.3650 - 0.3580	- = <del>0.0070</del>	= 0.0014 Inches Pe	er Year
years bet	ween t-iiitiai & t-actuai	3	3		
Remaining I	Half Life:				
t-actual - t Corrosio	$\frac{1 - \text{minimum}}{\text{on Rate}} / 2 = \frac{0.3580 - 0.00}{0.00}$	$\frac{-0.0568}{0014}$ / 2 = $\frac{0.301}{0.001}$	$\frac{.2}{.4} \div 2 = 215.1 /$	2 = 107.6 Years Rema	nining Half Life
Based	on the above corrosion rate	and half life calculation	, this pipe is due for	inspection: Mai	2022
_					
Comments					
	<u>Exic</u> <b>ξ</b> VT/UT II Tech				3/9/2017 Date



Facility Line No. Description	Leroy-Ostrander N/A P2/P4 Riser to Header	P&ID No. (First & Las N/A	st):	Status A  Regulated By: Insulated	0%	Inspection Interva Owner X Al Underground	PI PSM
Location	Boiler Room			Vibration: Previous Failure Dead Leg		X Moderate	Heavy ng/High Velocity
Service (Oil, G Fabrication Co Comments		Sour Servi Piping Class (1,2,3		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Co Anodes	
To be comp	leted in the field (The follow	ring conditions apply to	equipmen	t listed above):			
X External  N/A Visual External  N/A Non-typ  X Condition	Moder	urface rust, no scaling o ate (pit depth not greate e (pit depth greater that see comments): rvice (see comments).	er than C.A n C.A./hea		Fair	Pit Scale Scale sfactory	Unsatisfactory  X Poor Unsatisfactory
	on of coating (see comments):	.omments)		Good	Fair		Poor
UT II Tech:	Eric Esp	e		_		Inspection Date:	3/9/2017
N/A Enginee  Comments: 2. 3. 4. 5. 6. 7.	lings Taken. 100 %	comments).		re requirements		lated e (LFET, PT, MT, Etc	Not Required
8.							
9.							
Action Items 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.					Resp. Dept.	Govn.  By Mand	Rec         1         2         3           Image: Control of the
Authorized U			_			Review Date:	3/24/2016

									SI	HEET <u>1</u>	of <u>1</u>
FACILITY	′ <u> </u>		Leroy-Ostrander	School		LIN	E NO	N/A	INSPECTION D	DATE	3-9-17
LOCATIO	ON			Boil	er Rooi	n			PAINT/INSULATION None		
DESCRI	PTION			]	P2/P4 Riser				TECHNICIAN	Erio	Espe
REMARK	(S (Insp. I	Method,	Equip. Type, Serial No	o., Etc.)	U	TT, Olyı	npus 38 DL I	Plus - S/N 12040	<mark>6903, Panametric</mark>	es D790 - S/	N 902401
DESN.		LOC.	COMP TYPE		CIZE	NOM. THICK	12:00	3:00	6:00	9:00	<u></u>
PRES.	N/A		COMP. TYPE Pipe	MATL. <b>A106B</b>		0.216	_	-	0.197	-	Τ
30	N/A		Pipe	A106B		0.216	-	-	0.199	-	
											+
											+
									+		+
-									-		
											+
											<del> </del>
											+
+								+	+ +		+
									+		+
								+	+		+
Commen	nts:	C	omponents listed a	ıs "N/A" a	t heigh	ts, cover	ed, contain ex	cessive part geo	metry or otherwi	se not acce	ssible.
-											

Signature UTII Tech. Etic Espe

CODE



Facility Line No.	Leroy-Ostrander N/A P2/P4 Riser to Header	P&ID No. (First & Last) N/A	:	Status A Regulated By:	0%	Inspection Inter	API	5 PSM
Description Location	Boiler Room			Insulated Vibration: Previous Failure Dead Leg		Undergrou  Moderate  Sand Prod  Injection F	ucing/High	Heavy 🔲
Service (Oil, G Fabrication Co Comments		Sour Service Piping Class (1,2,3,4)		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Anodes Full		UT/VT 🔀
To be comp	leted in the field (The follo	wing conditions apply to e	quipment	t listed above):				
X External  N/A Visual External  N/A Non-typ  X Conditio  X Conditio	Moder	surface rust, no scaling or prate (pit depth not greater ne (pit depth greater than (see comments): ervice (see comments).	than C.A. C.A./heav		Pit Satis Fair	Scale Sfactory	X	Unsatisfactory Poor Unsatisfactory Poor
UT II Tech:	Eric Esp	oe				Inspection Date	e:	3/9/2017
N/A Engineer	ings Taken. 100 % DE. % ss measurements are less tha ring evaluation requested (se	e comments).		accessible e requirements		lated e (LFET, PT, MT,		Not Required
Comments: 2.	1. None noted at time of	inspection						
3. 4. 5. 6.								
7. 8. 9.								
Action Items					Resp. Dept.	Govn. By Ma	nd Red	Action Code 1 2 3
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.								
Authorized U						Revie Date		3/24/2016

#### **POET Biorefining**

# PIPING THICKNESS MEASUREMENTS (inches)

	FACILIT	Y		Leroy-Ostrande	r School		LINE	NO	N/A	INSPECTION	DATE	3-9-17
	LOCATION	 ИС			Boil	er Roo	m			PAINT/INSUL/	ATION	None
	DESCRI	PTION			I	P2/P4 R	Riser			TECHNICIAN	Er	ric Espe
	REMARI	KS (Insp.	Method.	, Equip. Type, Serial I	No., Etc.)	U'.	ΓΤ, Olvm	pus 38 DL P	lus - S/N 1204	— 06903, Panametı	rics D790 -	S/N 9024
		- ( -1		, 1-1 31 -,	,,					· · · · · · · · · · · · · · · · · · ·		
	DE011	1	LOC.		1		NOM.	12:00	3:00	6:00	9:00	1
Е	DESN.			COMP. TYPE	MATL.	SIZE	THICK	12.00	3.00	6.00	9.00	
1	30	N/A	1	Pipe	A106B			-	<del>-</del>	0.197	T -	
1	30	N/A	2	Pipe	A106B		0.216	_	+ -	0.199	-	
				r					1			
											<u> </u>	
											<del>                                     </del>	
					1		<del>                                     </del>		+	+	<del>                                     </del>	
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					†				1	1	†	
									_		┼	
					+				+	+	+	
									+	+	<del>                                     </del>	
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									+		<u> </u>	
					+				+	+	<del>                                     </del>	
					†				+	1	†	
					<u> </u>							
					<del>                                     </del>		<del>                                     </del>				—	
					+				+	+	<del>                                     </del>	
					<del>                                     </del>		<del>                                     </del>		+	+	<del>                                     </del>	
					1						$\vdash$	
					1				1	1	<u> </u>	
	C		~	,		1		1 4 •	<del></del>	1	<del></del>	
	Comme	nts:	Co	mponents listed a	s "N/A" at	neight	s, covered	i, contain ex	cessive part ge	eometry or other	wise not ac	cessible.

Signature UTII Tech. Eric Espe

QC Form-Thickness Measurement (Piping)

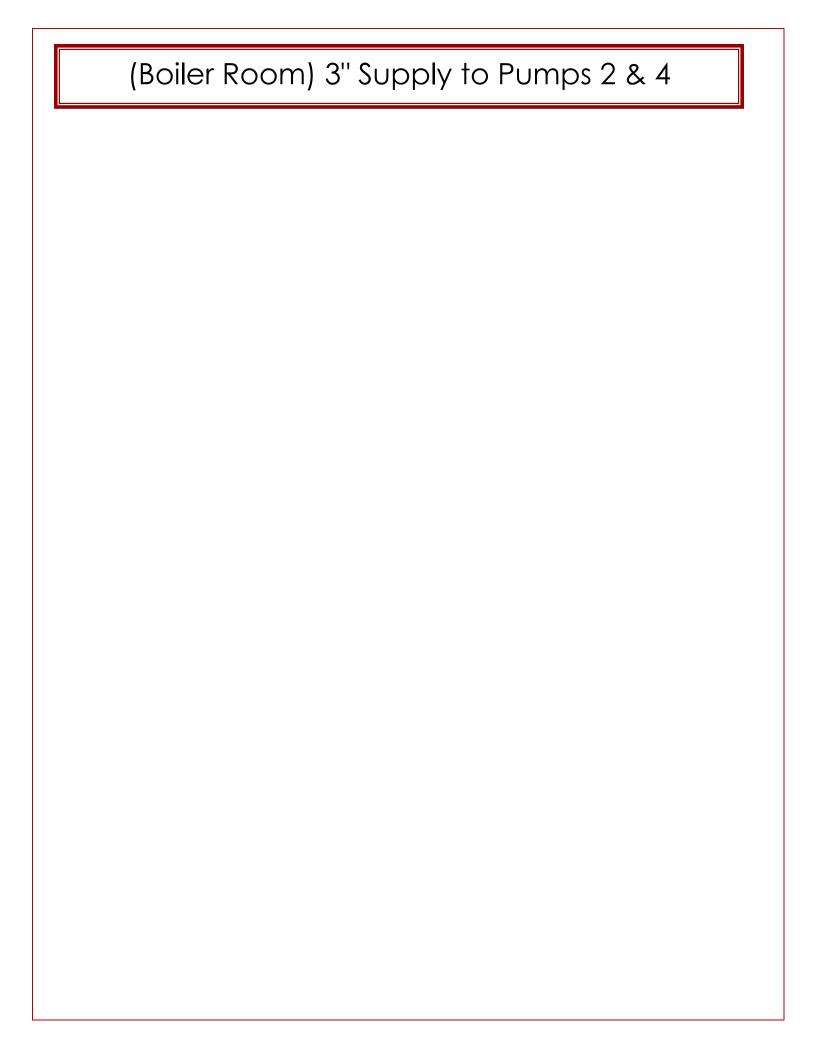
Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

Facility Location	Leroy-Ostrander	Equip. #		Insp. Date Pump 4 Riser to Header	3/9/2017
Location	Boiler Room	Description	Pump 271	Pump 4 Kiser to Heade	r
		Inspection Inforr			
Pipe Size		3	<b>D</b> = Outside Di		3.5
Material		A106B	<b>S</b> = Allowable		20,000
Current Insp		2017	P = Design Pre		30
	vious Thickness Reading Year	2012		ency (seamless E=1)	0.9
Initial Thickn	ection Interval	5		ngth Reduction Factor	1.0
Actual Thickn		0.216	<b>Y</b> = Temperatu	emp. above 800°F)	0.4
Actual IIIICKI	11033				0.4
		Calculation Infor	mation		
Minimum Th	hickness Calculation:				
	<b>PD</b>	20	v 25	105	
	$t = \frac{PD}{2(SE+PY)}$	$=\frac{30}{2 \times ((20.000))}$	( 0.9 )+( 30 x	$\frac{103}{(0.4)} = \frac{103}{34.024}$	<del></del>
	_(==:::)	- x ((0,000 )	. 0.0 / 1	0.70=1	
	t = Required Minim	num Thickness =	0.0301		
	e above calculation, this pipe	meets the required minu	ımum thickness for	continued service at	the current
pressure.					
		-1.1			
	ct - Structural Muni		Λ 1ΛΛΛ		
			0.1000		
		mum Inickness = n thickness based on carl			
This pipe m	Structural minimur	m thickness based on carl	bon pipe		
	Structural minimun	m thickness based on carl	bon pipe		
This pipe me	Structural minimun	m thickness based on carl	bon pipe		
Corrosion Ra	Structural minimum neets the required Structural Mate:	m thickness based on cark	continued service.		
Corrosion Ra	Structural minimum neets the required Structural Mate:	m thickness based on cark	continued service.	- 0.0038 Inches Pe	er Year
Corrosion Ra	Structural minimum neets the required Structural Mate:	m thickness based on cark	continued service.	- 0.0038 Inches Pe	er Year
Corrosion Ra	Structural minimum  eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual	m thickness based on cark	continued service.	- 0.0038 Inches Pe	er Year
Corrosion Ra t-i years betw Remaining H	Structural minimum neets the required Structural Mate: initial - t-actual ween t-initial & t-actual Half Life:	m thickness based on carl Minimum Thickness for o 0.2160 - 0.1970 5	continued service.  = \frac{0.0190}{5} =		
Corrosion Ra t-i years betw Remaining H t-actual - t-	Structural minimum  meets the required Structural Mate:  initial - t-actual ween t-initial & t-actual  Half Life:  -minimum / 2 = 0.1970 -	10.0301 / 2 = 0.1669	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5} = \frac{0.0190}{5}$		
Corrosion Ra t-i years betw Remaining H	Structural minimum  meets the required Structural Mate:  initial - t-actual ween t-initial & t-actual  Half Life:  -minimum / 2 = 0.1970 -	10.0301 / 2 = 0.1669	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5} = \frac{0.0190}{5}$		
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio	Structural minimum  meets the required Structural Mate:  initial - t-actual ween t-initial & t-actual  Half Life:  -minimum / 2 = 0.1970 -	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for $\frac{0.2160 - 0.1970}{5}$	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	! = 22.0 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	Structural minimum  neets the required Structural Mate:    initial - t-actual	Minimum Thickness for one of the continuous of	bon pipe  continued service. $= \frac{0.0190}{5} = \frac{0.0190}{5}$	? = 22.0 Years Remainspection: Mar	aining Half Life

# (Boiler Room) Pump 2 & 4 Riser



P2 & P4 Riser to Header



Facility Leroy-Ostrander Line No. N/A Description Supply to Pumps	P&ID No. (First & Las	st):	Status A Regulated By: Insulated		nspection Interval Owner X API Underground	
Location Boiler Room			Vibration: Previous Failure Dead Leg	Light Z	Moderate [	Heavy []
Service (Oil, Gas, Etc.) Fabrication Code Comments  Steam B 31.1	Sour Servi Piping Class (1,2,3		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Cou Anodes	
To be completed in the field (The foll	owing conditions apply to	equipment li	sted above):			
N/A No areas of concern noted during p  X External Corrosion: X Light  Mod	hysical inspection. t (surface rust, no scaling of lerate (pit depth not greate eme (pit depth greater that is (see comments): service (see comments).	r pitting). er than C.A./I	ight scale). scale). ————————————————————————————————————	Pit Satisfa Fair X Satisfa Fair		Unsatisfactory  X Poor Unsatisfactory Poor
UT II Tech: Exic &	spe		_	 Ir	nspection Date:	3/9/2017
NA Other NDE.  N/A Thickness measurements are less the N/A Engineering evaluation requested (see Section 1). Damaged Insulation 2.  3. 4. 5. 6.	see comments).		requirements	Type (	ted (LFET, PT, MT, Etc.)	Not Required
7.						
8. 9. 10.				Resp.	Govn.	Action Code
Action Items				Dept.	By Mand	Rec 1 2 3
<ol> <li>Repair and or replace damaged install</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> <li>10.</li> </ol>	Jation.			Mait.		
Final Review:  Authorized UTII Tech: Επία Ευρε		_			Review Date:	3/24/2016

										SHEET 1	of <u>1</u>
FACILIT	Y		Leroy-Ostrander	School		LIN	E NO.	N/A	INSPECTION	DATE	3-9-17
LOCATIO	NC		-	Boil	er Roo	m			PAINT/INSUL	ATION	None
DESCRI	PTION	Leroy-Ostrander School LINE NO. N/A  Boiler Room  Supply to Pumps 2&4							TECHNICIAN	Eric	Espe
REMAR	S (Insp.	p. Method, Equip. Type, Serial No., Etc.) UTT, Olympus 38 DL Plus - S/N 120406903, Panametrics D790 - S/N 902401									
DEON		LOC.			<u> </u>	NOM.	12:00	3:00	6:00	9:00	1
DESN. PRES.	SPEC.		COMP. TYPE	MATL.	SIZE	THICK	12.00	3.00	0.00	9.00	1
30	N/A		Pipe	A106B	3"	0.216	-	0.185	-	0.195	
1											1
								+			
<u> </u>									<u> </u>		
<u> </u>											
Commer	nts:	C	omponents listed a	ıs ''N/A'' a	t heigh	ts, cover	ed, contain ex	cessive part ged	metry or other	uise not acce	ssible.
			•			•	•		*		
						S	Signature UT	TII Tech. <mark>Eric</mark>	Espe		

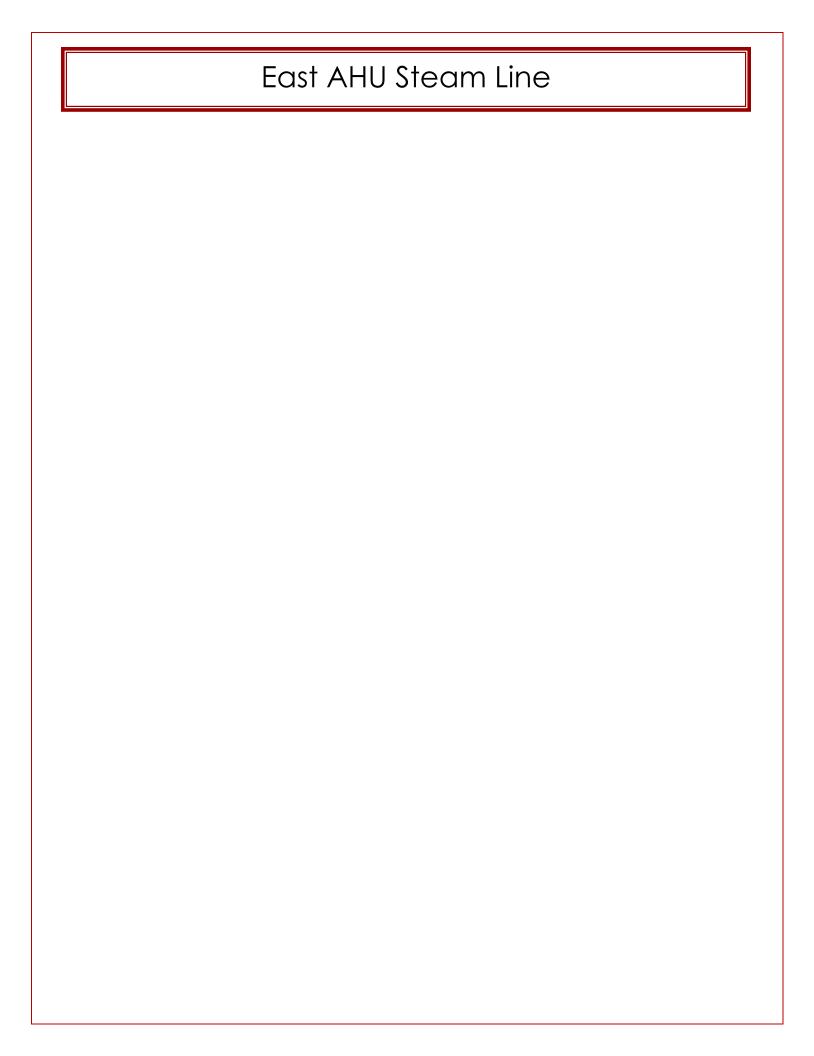
Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Leroy-Ostrander	Equip. #	N/A	Insp. Date	3/9/2017
ocation	Boiler Room	Description		y to Pumps 2 & 4	
		Inspection Infor	rmation		
Pipe Size		3	<b>D</b> = Outside Dia	meter	3.5
Material		A106B	S = Allowable St		20,000
Current Inspe	ection Year	2017	P = Design Press		30
•	vious Thickness Reading Year	2017	<b>E</b> = Joint Efficier		0.9
	ection Interval	5		gth Reduction Factor	1.0
Initial Thickn		0.216	_	mp. above 800°F)	1.0
Actual Thickr		0.185	Y = Temperatur		0.4
B.4:: Tle	sialmaaa Calaulatiam.	Calculation Info	rmation		
iviinimum in	nickness Calculation:				
	PD	30	v 35	105	
	$t = \frac{PD}{2(SE+PY)}$	$=\frac{30}{2 \times ((20.000))}$	x 0.9 )+( 30 x	$\frac{103}{0.4 } = \frac{103}{34.024}$	<del></del>
	_(0_1111)	((		3.1,0 <u></u>	
	t = Required Minir	num Thickness =	0.0301		
		•			
Based on the	e above calculation, this pipe	meets the required min	umum thickness for o	continued service at t	the current
pressure.					
-					
_					
	st = Structural Min	nimum Thickness =	0.1000		
		nimum Thickness = m thickness based on car			
	Structural minimu	m thickness based on cal	rbon pipe		
		m thickness based on cal	rbon pipe		
	Structural minimu	m thickness based on cal	rbon pipe		
This pipe me	Structural minimu eets the required Structural ate:	m thickness based on car	rbon pipe continued service.		
This pipe me	Structural minimu eets the required Structural ate:	m thickness based on car	rbon pipe continued service.	0.0062 Inches Pe	ır Year
This pipe me	Structural minimu	m thickness based on car	rbon pipe continued service.	0.0062 Inches Pe	r Year
This pipe me Corrosion Ra t-i years betw	eets the required Structural ate: initial - t-actual ween t-initial & t-actual	m thickness based on car	rbon pipe continued service.	0.0062 Inches Pe	r Year
This pipe me	eets the required Structural ate: initial - t-actual ween t-initial & t-actual	m thickness based on car	rbon pipe continued service.	0.0062 Inches Pe	r Year
This pipe me Corrosion Ra t-i years betw Remaining H	Structural minimu eets the required Structural inte: initial - t-actual ween t-initial & t-actual lalf Life:	m thickness based on car  Minimum Thickness for  0.2160 - 0.1850  5	rbon pipe  continued service.  = \frac{0.0310}{5} =		
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t-	Structural minimu  eets the required Structural ate: initial - t-actual ween t-initial & t-actual lalf Life:	m thickness based on car  Minimum Thickness for	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{5} \div 2 = 25.0 / 2$		
This pipe me Corrosion Ra t-i years betw Remaining H	Structural minimu  eets the required Structural ate: initial - t-actual ween t-initial & t-actual lalf Life:	m thickness based on car  Minimum Thickness for	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{5} \div 2 = 25.0 / 2$		
This pipe mo Corrosion Ra  t-i years betw  Remaining H  t-actual - t-i Corrosion	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate: initial - t-actual ween t-initial & t-actual lalf Life:	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	m thickness based on car Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life
This pipe me Corrosion Ra t-i years betw Remaining H t-actual - t-	Structural minimu  eets the required Structural ate:  initial - t-actual ween t-initial & t-actual  lalf Life:  minimum n Rate  / 2 = 0.1850 - 0.00	Minimum Thickness for $ \frac{0.2160 - 0.1850}{5} $ $ \frac{0.0301}{062} / 2 = \frac{0.154}{0.006} $ and half life calculation,	rbon pipe  continued service. $= \frac{0.0310}{5} = \frac{9}{2} \div 2 = 25.0 / 2$	= 12.5 Years Rema	ining Half Life

# (Boiler Room) 3" Supply to Pumps 2 & 4



Damaged Insulation



Facility Line No. Description	Leroy-Ostrander N/A East AHU Steam Line	P&ID No. (First & Las N/A	t):	Status A Regulated By: Insulated		nspection Interval Dwner X AP Underground	••••
Location	Boiler Room			Vibration: Previous Failure	Light [	Moderate Sand Producir	Heavy
Service (Oil, G Fabrication Co Comments		Sour Servi Piping Class (1,2,3,		Dead Leg Air to Ground Over Water Inspection Type: Other (Specify)		Injection Point Corrosion Cou Anodes Full Pa	
To be compl	leted in the field (The follow	ving conditions apply to	equipment li	sted above):			
N/A Visual Ex  N/A Visual Ex  N/A Non-typ  X Conditio  X Conditio	corrosion:  X Light (some part of the part	sical inspection.  surface rust, no scaling of ate (pit depth not greate e (pit depth greater than see comments):  rvice (see comments).	pitting). r than C.A./I	ight scale). scale).  od	Pit Satisf Fair X Satisf Fair	Scale Scale actory	Unsatisfactory  X Poor Unsatisfactory Poor
UT II Tech:	Eric Esp	e			l	nspection Date:	3/9/2017
N/A RT Perfo x UT Read NA Other NI N/A Thickness	ings Taken. 100 % DE. % ss measurements are less than ring evaluation requested (see		gn pressure r		Insula Type	eted (LFET, PT, MT, Etc.	Not Required
<ol> <li>Threade</li> <li>4.</li> <li>5.</li> </ol>	d components used in piping		a undereut c	лг ріршід.			
6. 7. 8. 9.							
10. Action Items					Resp. Dept.	Govn. By Mand	Action Code Rec 1 2 3
	veld undercut at location 3. with visual inspection.				Maint.	L-O N L-O	
Authorized U	TII Tech: Exic Espe					Review Date:	3/24/2016

										OUTET 1	of 1
FACILIT	Y		Lerov-Ostrander	School		LINE NO. N/A  U Steam Line				SHEET 1	·-
LOCATI	ON		zeroj ostranaci	East AH	U Stear	 n Line		1,112	PAINT/INSULATION None		None
DESCRI	PTION			Steam	Line to	East AH	III		TECHNICIAN Eric Espe		r Esne
									_		
	(	Method, Equip. Type, Serial No., Etc.)  UTT, Olympus 38 DL Plus - S/N 1204						oros, i anamen	ics D170 Bi	11702401	
DESN.		LOC.				NOM.	12:00	3:00	6:00	9:00	
	SPEC.		COMP. TYPE	MATL.		THICK	0.100	1 0 104	0.107	0.010	Ī
30	N/A	2	Pipe	A106B A106B		0.216	0.190 0.212	0.194 0.213	0.196 0.226	0.210 0.219	
30	N/A N/A	3	Reducer Pipe	A106B	3 XZ		0.212	0.213	0.226	0.219	
30	N/A	4	Pipe	A106B	2''	0.154	0.130	0.133	0.137	0.145	
30	N/A	5	CTN	A106B	2''	-	N/A	N/A	N/A	N/A	
30	N/A	6	Pipe	A106B		0.154	-	0.129	-	-	
30	N/A	7	90	A106B		0.154	-	0.152	-	-	
30	N/A	8	CTN	A106B	2''	-	N/A	N/A	N/A	N/A	
30	N/A	9	Pipe	A106B	2''	0.154	N/A	N/A	N/A	0.14	
+	1										
1	1										
+											
+	+										
								+			
	1										
1											
+	1										
+	1								1		
+	1				1			+	1		+
+	†					<del>                                     </del>					
	1							1	1		
Comme	nts:	C	omponents listed a	s ''N/A'' a	t heigh	ts, cover	ed, contain ex	cessive part geo	metry or other	wise not acce	ssible.
							TU, Weld Und		,		

Threaded fittings except at locations 1, 2 and 3

Signature UTII Tech. Eric Espe

QC Form-Thickness Measurement (Piping)

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Lero	y-Ostrander	Equip. #	N/A		3/9/2017
cation	East A	HU	Description		t AHU Steam Line	
			Inspection Info	rmation		
Pipe Size			2	<b>D</b> = Outside Di	ameter	2.4
Material			A106B	<b>S</b> = Allowable	Stress Value	20,000
Current Insp	ection Year		2017	<b>P</b> = Design Pre	essure	30
Initial or Pre	vious Thicknes	s Reading Year	2012	<b>E</b> = Joint Effici	ency (seamless E=1)	0.9
•	ection Interva		5	<b>W</b> = Weld Stre	ngth Reduction Factor	1.0
Initial Thickn			0.154		temp. above 800°F)	
Actual Thick	ness		0.129	Y = Temperati	ure Factor	0.4
			Calculation Info	rmation		
Minimum Th	hickness Calcu	lation:				
	t =	PD 2(SE+DV)	$= \frac{30}{2 \times ((20,000))}$	x 2.375	$\frac{71.25}{(0.4)} = \frac{71.25}{(0.4)}$	<del></del>
		2(36+21)	2 X (( 20,000	x 0.9 )+( 30 )	( 0.4 )) 34,024	
	t =	Required Minim	um Thickness =	0.0211		
		•				
Based on th	e above calcu	lation, this pipe	meets the required mi	numum thickness for	r continued service at	the current
pressure.		,	•			
Corrosion Ra	ate:		Ainimum Thickness for			
	initial - t-actua	=	0.1540 - 0.1290 5	- = <u>0.0250</u> :	= 0.0050 Inches Po	er Year
years betv	ween t-initial 8	& t-actual	5	5		
Remaining H	Half Life:					
t-actual - t-	-minimum ,	2 _ 0.1290 -	0.0211 / 2 _ 0.107	79 . 2 - 21.6 / 3	) - 10 9 Vacus Dame	sining Half Life
Corrosio	on Rate	0.00	$\frac{0.0211}{50}$ / 2 = $\frac{0.107}{0.009}$	<del>50</del> ÷ 2 - 21.6 / 6	2 – 10.6 feats Reilla	anning Han Life
Based	on the above	corrosion rate a	nd half life calculation	, this pipe is due for	inspection: Mai	r 2022
mmonte						
mments						
						-
		Cara C				2/0/2017
		VT/UT II Tech.				3/9/2017
		vi/Ui II iech.	Signature			Date

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

ocation	Leroy-Ostrander	Equip. #		3/9/2017
	East AHU	Description	East AHU Steam Line	
		Inspection Info	rmation	
Pipe Size		3	<b>D</b> = Outside Diameter	3.5
Material		A106B	<b>S</b> = Allowable Stress Value	20,000
Current Inspe	ction Year	2017	P = Design Pressure	30
	ious Thickness Reading Year	2012	<b>E</b> = Joint Efficiency (seamless E=1)	0.9
API 570 Inspe	<del>-</del>	5	<b>W</b> = Weld Strength Reduction Factor	1.0
Initial Thickne		0.216	(W=1 unless temp. above 800°F)	
Actual Thickn	ess	0.19	Y = Temperature Factor	0.4
		Calculation Info	ormation	
Minimum Thi	ickness Calculation:	calculation init	, macion	
	$t = \frac{PD}{2(SE+PY)}$	_ 30	$\frac{x}{x \ 0.9} + (30 \ x \ 0.4)) = \frac{105}{34,024}$	- + 0.02 <b>7</b>
	2(SE+PY)	= 2 x (( 20,000	x 0.9 )+( 30 x 0.4 )) 34,024	1 0.027
	t = Required Minin	num Thickness =	0.0301	
Događ on the	shove calculation this nine	mosts the required min	numum thickness for continued service at the	ao ou mont
	above calculation, this pipe	meets the required him	numum thickness for continued service at th	ie current
pressure.				
	st = Structural Min	imum Thickness =	0.1000	
		_		
	Structural minimu	m thickness based on ca	пьоп ріре	
This nine me	ets the required Structural 1	Minimum Thickness for	r continued service	
		VIIIIIIIIIII TIIICKIIESS 101	- Continued Service.	
Corrosion Ra	te:			
<b>.</b> :	sitial tractural	0 2160 0 1000	0.0360	
	nitial - t-actual	0.2160 - 0.1900	$- = \frac{0.0260}{5} = 0.0052$ Inches Per	Year
	nitial - t-actual een t-initial & t-actual	5 0.2160 - 0.1900	$- = \frac{0.0260}{5} = 0.0052$ Inches Per	Year
years betw	een t-initial & t-actual	5	$- = \frac{0.0260}{5} = 0.0052$ Inches Per	Year
	een t-initial & t-actual	5 0.2160 - 0.1900	$- = \frac{0.0260}{5} = 0.0052$ Inches Per	Year
years betw	een t-initial & t-actual			
years betw Remaining Ha t-actual - t-r	een t-initial & t-actual			
years betw	een t-initial & t-actual		$- = \frac{0.0260}{5} = 0.0052$ Inches Per $\frac{99}{52} \div 2 = 30.8 / 2 = 15.4$ Years Remain	
years betw Remaining Ha t-actual - t-r Corrosior	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosior	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosior	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	$\frac{0.0301}{052} / 2 = \frac{0.159}{0.005}$	99 52 ÷ 2 = 30.8 / 2 = 15.4 Years Remain	ning Half Life
years betw Remaining Ha t-actual - t-r Corrosion Based of	reen t-initial & t-actual  alf Life:  minimum n Rate  / 2 = 0.1900 - 0.000	0.0301 / 2 = 0.155 0.005 and half life calculation	$\frac{99}{52} \div 2 = 30.8 / 2 = 15.4$ Years Remains, this pipe is due for inspection:  Mar 2	ning Half Life

VT/UT II Tech. Signature

Date

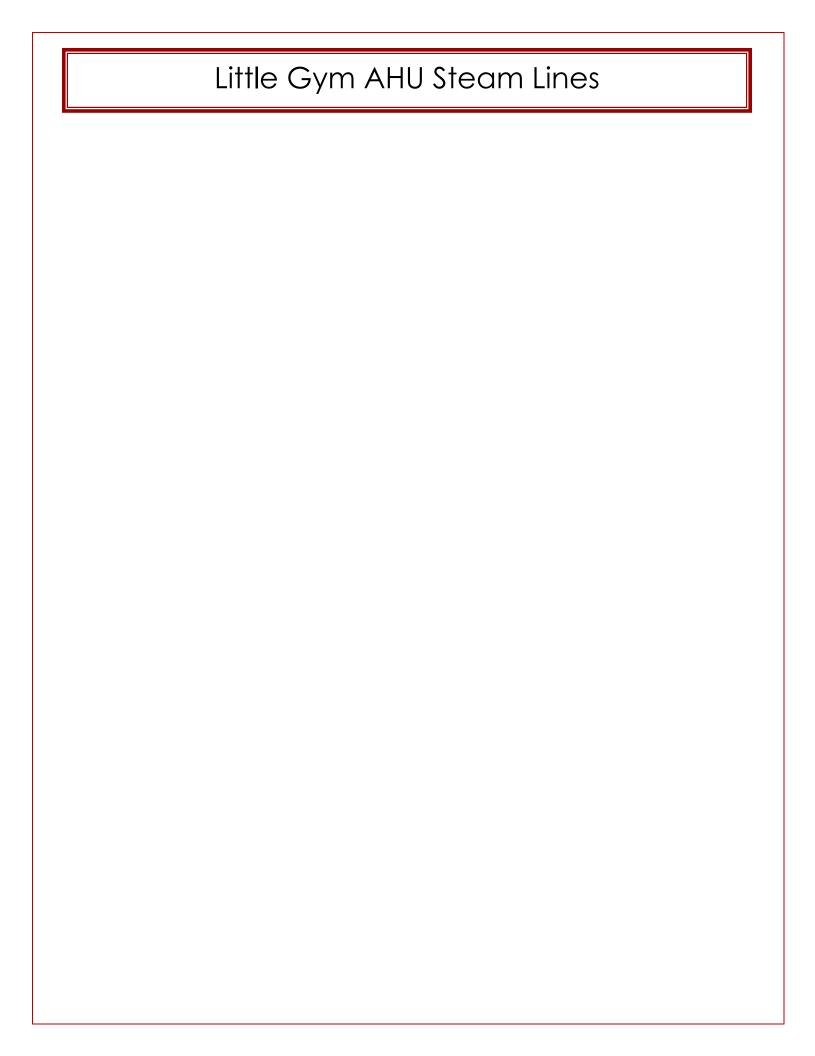
## East AHU Steam Line



VTU – Undercut on pipe Loc. 3



Undercut/Underfill Loc. 3



Facility Line No. Description	Leroy-Ostrander N/A Steam Lines for AHU	P&ID No. (First & Las	st):	Status A  Regulated By: Insulated	0%	Inspection Interval Owner X AF Underground	PI PSM
Location	Little Gym			Vibration: Previous Failure Dead Leg		X Moderate	Heavy ng/High Velocity
Service (Oil, G Fabrication C Comments		Sour Servi Piping Class (1,2,3		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Co	
To be comp	leted in the field (The follow	ving conditions apply to	equipmen	t listed above):			
N/A Visual E. N/A Non-typ X Conditio	Moder: Extrem  xamination of existing welds (s  ical fittings/components in ser on of insulation: on of supports/restraints (see o	urface rust, no scaling o ate (pit depth not greate e (pit depth greater that see comments): rvice (see comments).	er than C.A n C.A./hea	vy scale).  Good	Fair X Satis	Pit Scale Scale sfactory  sfactory	Unsatisfactory  X Poor Unsatisfactory
N/A Condition	on of coating (see comments):			Good	Fair		Poor
UT II Tech:	Eric Esp	e				Inspection Date:	3/9/2017
	lings Taken. 100 %	comments).		re requirements		lated e (LFET, PT, MT, Etc	Not Required
8.							
9. 10.					Resp.	Govn.	Action Code
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. Final Review:					Dept.	By Mand	Rec 1 2 3
Authorized U			_			Review Date:	3/24/2016

										SHEET 1	of <u>1</u>
FACILITY	/		Lerov-Ostrander	School		LIN	F NO	N/A	INSPECTION	DATE	3-9-17
LOCATIO	N		Leroy-Ostrander	Lit	tle Gvn	`` ``		14/21	PAINT/INSUL	ATION	None
DESCRIE	PTION			Suppl	v Line	to AHU'	<u> </u>		TECHNICIAN	Eric	Esne
REMARK	(S (Insp	Method	Equip. Type, Serial No	n Etc.)	J ZIIIC	TT Oly	mnus 38 DL P	lus - S/N 12040	6903 Panametr	rics D790 - S/	N 902401
T(LIVI) (I(I)	to (mop.	wicti iou,	Equip. Type, ochar 14	J., L.O.)		11, Oly	inpus 30 DL 11	lus - 5/11 12040	5705, I anamen	ICS D170 - 5/1	1 702401
1	1					NOM				T	1
DESN.	0050	LOC. NO.	OOMD TVDE		CIZE	NOM. THICK	12:00	3:00	6:00	9:00	
PRES.	SPEC.	1	COMP. TYPE Pipe	MATL. <b>A106B</b>	3''	0.216	0.199	0.198	0.186	0.197	
30	N/A	2	Tee	A106B		0.216	0.201	0.170	-	0.316	
30	N/A	3	Pipe	A106B		0.216	0.190	0.193	0.198	0.19	
30	N/A	4	Pipe	A106B	3''	0.216	0.192	0.195	0.196	0.195	
30	N/A	5	Pipe	A106B	1"	0.133	0.136	0.136	0.126	0.132	
30	N/A	6	Pipe	A106B	1''	0.133	0.125	0.130	0.129	0.128	
+											
								†	1		
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								†	<u> </u>		
	<u> </u>							1	<u> </u>		
Commen	nts:	C	omponents listed a	ıs ''N/A'' a	t heigh	ts, cover	ed, contain exc	essive part geo	metry or other	wise not acces	ssible.

Signature UTII Tech. Etic Espe

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Leroy-Ostrander	Equip. #	N/A	Insp. Date	3/9/2017
ocation	Little Gym	Description	East	AHU Steam Line	
		Inspection Infor	rmation		
Pipe Size		1	<b>D</b> = Outside Di	ameter	1.3
Material		A106B	<b>S</b> = Allowable	Stress Value	20,000
Current Inspe	ection Year	2017	P = Design Pre		30
•	vious Thickness Reading Year	2012	_	ency (seamless E=1)	0.9
	ection Interval	5		ngth Reduction Factor	1.0
Initial Thickne		0.133		temp. above 800°F)	
Actual Thickn	ness	0.126	Y = Temperatu		0.4
		Calculation Info	rmation		
Minimum Th	nickness Calculation:	Calculation into	rmation		
William III	iickiiess Calculatioii.				
	. PD	30	x 1.315	39.45	
	$t = {2(SE+PY)}$	$= \frac{30}{2 \times ((20,000))}$	x 0.9 )+( 30 x	( 0.4 )) = 34,024	<del></del>
	t = Required Minii	mum Thickness =	0.0182		
	e above calculation, this pipe	e meets the required min	lumum thickness for	continued service at	the current
nressure					
pressure.		-			
Propure.	ct – Structural Mir	nimum Thicknoss -	0.0000		
pressure		nimum Thickness =			
pressure		nimum Thickness = um thickness based on car			
	Structural minimu	ım thickness based on cai	rbon pipe		
This pipe me	Structural minimu	ım thickness based on cai	rbon pipe		
	Structural minimu	ım thickness based on cai	rbon pipe		
This pipe me	Structural minimusets the required Structural site:	m thickness based on car Minimum Thickness for	rbon pipe continued service.		
This pipe me	Structural minimusets the required Structural site:	m thickness based on car Minimum Thickness for	rbon pipe continued service.	= 0.0014 Inches Pe	er Year
This pipe me	Structural minimu	m thickness based on car Minimum Thickness for	rbon pipe continued service.	= 0.0014 Inches Pe	er Year
This pipe me	eets the required Structural ate: anitial - t-actual veen t-initial & t-actual	m thickness based on car Minimum Thickness for	rbon pipe continued service.	= 0.0014 Inches Pe	er Year
This pipe me Corrosion Ra t-i years betw	eets the required Structural ate: anitial - t-actual veen t-initial & t-actual	m thickness based on car Minimum Thickness for	rbon pipe continued service.	= 0.0014 Inches Pe	er Year
This pipe me Corrosion Ra t-i years betw Remaining H	Structural minimulates the required Structural ate: Initial - t-actual aveen t-initial & t-actual alf Life:	Minimum Thickness for  0.1330 - 0.1260  5	rbon pipe  continued service.  = 0.0070 5		
This pipe me Corrosion Ra t-i years betw Remaining H	Structural minimu  eets the required Structural  ate:  initial - t-actual veen t-initial & t-actual  lalf Life:  minimum / 2 = 0.1260 -	Minimum Thickness for  0.1330 - 0.1260  5	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{0.0070}{5}$		
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion	Structural minimu  eets the required Structural  ate:  initial - t-actual veen t-initial & t-actual  lalf Life:  minimum / 2 = 0.1260 -	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based of	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	m thickness based on car  Minimum Thickness for $ \frac{0.1330 - 0.1260}{5} $ $ \frac{0.0182}{014} / 2 = \frac{0.107}{0.001} $	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Rema	aining Half Life
This pipe me Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion	Structural minimuseets the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual at t-actual at the structural at the structura	Minimum Thickness for $= \frac{0.1330 - 0.1260}{5}$ $= \frac{0.0182}{0.014} / 2 = \frac{0.107}{0.001}$ and half life calculation,	rbon pipe  continued service. $= \frac{0.0070}{5} = \frac{8}{4} \div 2 = 77.0 / 2$	2 = 38.5 Years Remainspection: Man	aining Half Life

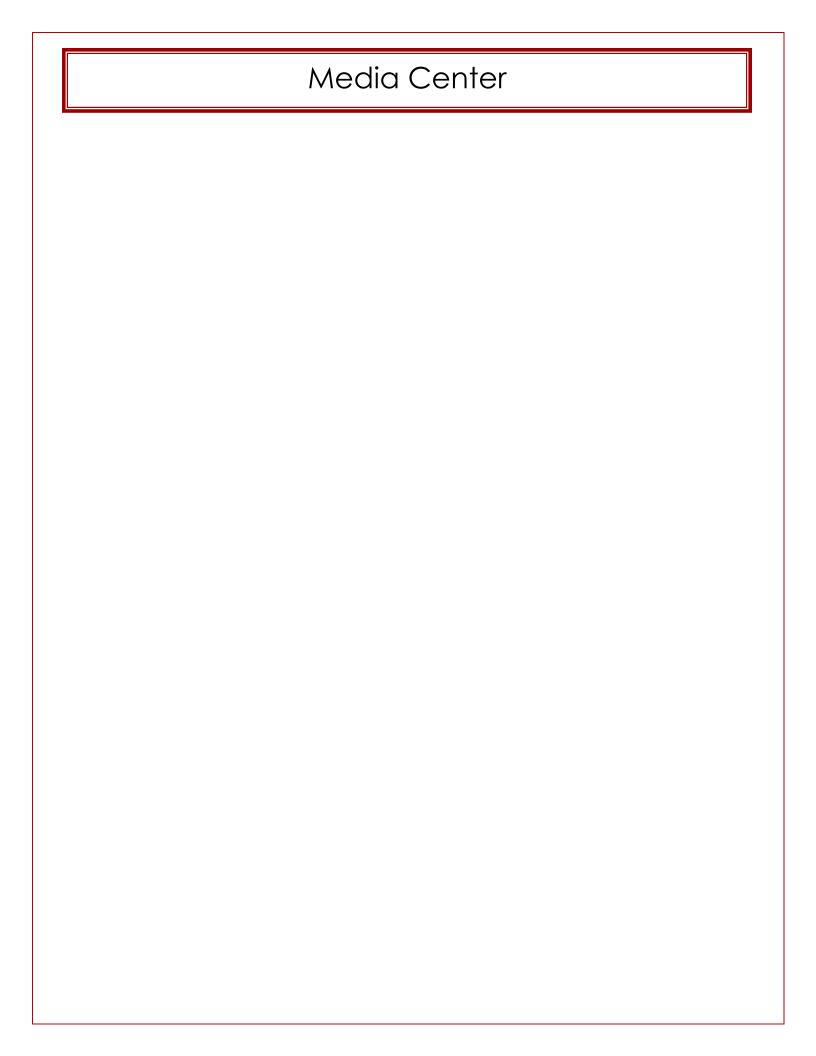
Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Leroy-Ostrander	Equip. #	N/A	Insp. Date3/9/2	017
ocation	Little Gym	Description	East AHU	J Steam Line	
		Inspection Inform	nation		
Pipe Size		3	<b>D</b> = Outside Diamete	er 3	3.5
Material		A106B	<b>S</b> = Allowable Stress		20,000
Current Inspe	ection Year	2017	P = Design Pressure		30
•	vious Thickness Reading Year	2012	<b>E</b> = Joint Efficiency (		0.9
API 570 Inspe	ection Interval	5	<b>W</b> = Weld Strength R	Reduction Factor	1.0
Initial Thickne		0.216	(W=1 unless temp. a		
Actual Thickn	ness	0.186	Y = Temperature Fa	ctor (	0.4
		Calculation Inform	mation		
Minimum Th	nickness Calculation:	Calculation inform	nation		
	PD	30	v 35	105	
	$t = \frac{15}{2(SE+PY)}$	$= \frac{30}{2 \times ((20,000 \times )^{-3})}$	0.9 )+( 30 x 0.4	$\frac{1}{1} = \frac{103}{34,024} + 0$	.027
	, ,	., ,	, ,		
	t = Required Minir	mum Thickness =	0.0301		
Based on the pressure.	e above calculation, this pipe	e meets the required minu	mum thickness for cont	inued service at the curre	ent
•					
	st = Structural Mir	nimum Thickness =	0.1000		
		·			
		nimum Thickness = um thickness based on carb			
This pipe me		ım thickness based on carb	oon pipe		
This pipe me	Structural minimu	ım thickness based on carb	oon pipe		
	Structural minimu	ım thickness based on carb	oon pipe		
Corrosion Ra	Structural minimuseets the required Structural ate: Initial - t-actual	m thickness based on carb	continued service.	0 0060 Inches Per Vear	
Corrosion Ra	Structural minimu eets the required Structural ate:	ım thickness based on carb	continued service.	0.0060 Inches Per Year	
Corrosion Ra t-ii years betw	Structural minimulates the required Structural ate: Initial - t-actual veen t-initial & t-actual	m thickness based on carb	continued service.	0.0060 Inches Per Year	
Corrosion Ra	Structural minimulates the required Structural ate: Initial - t-actual veen t-initial & t-actual	m thickness based on carb	continued service.	0.0060 Inches Per Year	
Corrosion Ra t-in years betw Remaining H	Structural minimulates the required Structural ate:  Initial - t-actual ate at the required Structural ate.  Initial - t-actual ate at the required structural at the required structur	Minimum Thickness for c  0.2160 - 0.1860  5	continued service.  = \frac{0.0300}{5} =		
Corrosion Ra t-i years betw Remaining H t-actual - t-i	Structural minimu  eets the required Structural  ate:  initial - t-actual veen t-initial & t-actual  lalf Life:  minimum / 2 = 0.1860 -	m thickness based on carb  Minimum Thickness for c $= \frac{0.2160 - 0.1860}{5}$	eontinued service.  = \frac{0.0300}{5} = = = = = = = = = = = = = = = = = = =		lf Life
Corrosion Ra t-in years betw Remaining H	Structural minimu  eets the required Structural  ate:  initial - t-actual veen t-initial & t-actual  lalf Life:  minimum / 2 = 0.1860 -	Minimum Thickness for c  0.2160 - 0.1860  5	eontinued service.  = \frac{0.0300}{5} = = = = = = = = = = = = = = = = = = =		lf Life
Corrosion Ra  t-ii  years betw  Remaining H  t-actual - t-i  Corrosion	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	lf Life
Corrosion Ra  t-ii  years betw  Remaining H  t-actual - t-i  Corrosion	Structural minimu  eets the required Structural  ate:  initial - t-actual veen t-initial & t-actual  lalf Life:  minimum / 2 = 0.1860 -	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	lf Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	lf Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	If Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	lf Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	lf Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	lf Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	If Life
Corrosion Ra  t-in years betw  Remaining H  t-actual - t-i Corrosion  Based (	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	m thickness based on carb  Minimum Thickness for c $ \frac{0.2160 - 0.1860}{5} $ $ \frac{0.0301}{060} / 2 = \frac{0.1559}{0.0060} $	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	If Life
Corrosion Ra  t-ii  years betw  Remaining H  t-actual - t-i  Corrosion	Structural minimulate:  Initial - t-actual veen t-initial & t-actual lalf Life:    minimum	Minimum Thickness for comparison of the contract of the contr	eontinued service.  = \frac{0.0300}{5} = 0.03	13.0 Years Remaining Ha	

## Little Gym AHU Steam Lines



Little Gym Testing Location



Facility Leroy-Ostrander Line No. N/A Description Media Center Spot-o	P&ID No. (First & Las	st):	Status A Regulated By:		spection Interval (y	rs) 5 PSM
Description Media Center Spot-c	песк		Insulated Vibration:	Light X	Underground Moderate	Heavy
Location Media Center			Previous Failure Dead Leg		Sand Producing Injection Point	
Service (Oil, Gas, Etc.) Steam Fabrication Code B 31.1 Comments	Sour Servi Piping Class (1,2,3		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Coup Anodes Full Part	
To be completed in the field (The	following conditions apply to	equipment lis	sted above):			
N/A No areas of concern noted during X External Corrosion: X Li	g physical inspection. ght (surface rust, no scaling o loderate (pit depth not greate streme (pit depth greater than elds (see comments): in service (see comments). (see comments)	r pitting). er than C.A./li	ight scale). scale). ————————————————————————————————————	Pit Satisfa  X Fair X Satisfa Fair	Scale ctory	Unsatisfactory  Poor Unsatisfactory Poor
	ic Espe		_		spection Date:	 3/9/2017
N/A RT Performed.  x UT Readings Taken. 8  NA Other NDE.  N/A Thickness measurements are less  N/A Engineering evaluation requester  Comments: 1. None Noted at tir 2.  3.	d (see comments).		equirements	Insulat Type (I	red LFET, PT, MT, Etc.)	Not Required
4.						
5. 6. 7. 8. 9. 10.						
Action Items				Resp.	Govn. By Mand	Action Code Rec 1 2 3
1.				Dept.	By Mand	Rec 1 2 3
2. 3. 4.					<u> </u>	
5. 6. 7. 8. 9.						
Final Review:  Authorized UTII Tech: Exic Espe		_			Review Date:	3/24/2016

										SHEET 1	of <u>1</u>
FACILITY	<i></i>		Leroy-Ostrander	School		LIN	E NO	N/A	INSPECTION	DATE	3-9-17
LOCATIO	ON			Med	ia Cent	er			PAINT/INSUL	ATION	None
DESCRI	PTION				Spot Cl	ieck			TECHNICIAN	Erio	Espe
REMARK	S (Insp.	Method,	Equip. Type, Serial No	o., Etc.)	U	TT, Olyı	mpus 38 DL P	lus - S/N 12040	6903, Panametr	ics D790 - S/	N 902401
DESN.		LOC.				NOM.	12:00	3:00	6:00	9:00	
	SPEC.		COMP. TYPE	MATL.	SIZE	THICK		0.00	0.00	0.00	1
30	N/A	1	Pipe	A106B		0.237	-	0.243	-	0.236	
30	N/A	2	Pipe	A106B		0.216	-	0.183	-	-	
30	N/A	3	Pipe	A106B		0.179	- 0.215	-	-	-	
30	N/A N/A	3.1	90 Pipe	A106B A106B	1"	0.179 0.179	0.215	0.164	0.173	0.177	
30	N/A	3.3	Pipe	A106B	1"	0.179	0.162	0.169	-	-	
- 50	14/12	5.5	Tipe	71100D		0.177	0.102	0.107			
<u> </u>											
+											
1											
Commer	ıts:	C	omponents listed a	ıs ''N/A'' a	t heigh	ts, cover	ed, contain exc	cessive part geo	metry or othery	vise not acces	ssible.

Signature UTII Tech. Etic Espe

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Leroy-Ostrander	Equip. #	N/A	Insp. Date 3/9/2017
ocation	Media Center	Description		1" Spot-check
Dina Cina		Inspection Info		. 1.2
Pipe Size		1	<b>D</b> = Outside Diamete	
Material		A106B	<b>S</b> = Allowable Stress	
Current Inspe		2017	P = Design Pressure	30
	vious Thickness Reading Year	2012	<b>E</b> = Joint Efficiency (s	
=	ection Interval	5	<b>W</b> = Weld Strength Re	
Initial Thickno		0.179	(W=1 unless temp. ab	
Actual Thickr	ness	0.162	<b>Y</b> = Temperature Fac	tor <u>0.4</u>
		Calculation Info	ormation	
Minimum Th	nickness Calculation:			
	, PD	30	x 1.315	39.45
	$t = \frac{PD}{2(SE+PY)}$	= 2 x (( 20,000	x 1.315 x 0.9 )+( 30 x 0.4	$\frac{1}{1} = \frac{33,43}{34,024} + 0.022$
	t = Required Minir	num Thickness =	0.0232	
Based on the	e above calculation, this pipe	meets the required min	numum thickness for conti	nued service at the current
pressure.				
	st = Structural Min	imum Thickness = _	0.0900	
	Structural minimu	m thickness based on co	arbon pipe	
This pipe me	eets the required Structural	Minimum Thickness fo	r continued service.	
Corrosion Ra	nte:			
t-i	nitial - t-actual	0.1790 - 0.1620	0.0170	
years betw	veen t-initial & t-actual	- <u>0.1790 - 0.1620</u> 5	- = <del></del>	0.0034 Inches Per Year
Remaining H	alf Life:			
t-actual - t-	$\frac{\text{minimum}}{2} / 2 = \frac{0.1620}{2.00}$	0.0232 / 2 _ 0.138	88 . 2 - 40 8 / 2 - 2	0.4 Years Remaining Half Lif
Corrosio	n Rate	0.003	<del> </del>	0.4 Tears Kemanning Hair Lif
Based o	on the above corrosion rate :	and half life calculation	, this pipe is due for inspec	etion: Mar 2022
			•	
mments				
	Eric E.	pe		3/9/2017

VT/UT II Tech. Signature

Date

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

acility	Leroy-Ostrander	Equip. #	N/A	Insp. Date	3/9/2017
ocation	Media Center	Description	Media C	Center 3" Spot-check	
		Inspection Info	ormation		
Pipe Size		3	<b>D</b> = Outside Dia	meter	3.5
Material		A106B	<b>S</b> = Allowable S	Stress Value	20,000
Current Insp	ection Year	2017	<b>P</b> = Design Pres	ssure	30
Initial or Pre	vious Thickness Reading Year	2012	<b>E</b> = Joint Efficie	ncy (seamless E=1)	0.9
API 570 Insp	ection Interval	5	<b>W</b> = Weld Stren	gth Reduction Factor	1.0
Initial Thickn		0.216		emp. above 800°F)	
Actual Thick	ness	0.183	<b>Y</b> = Temperatu	re Factor	0.4
		Calculation Info	ormation		
Minimum Th	nickness Calculation:				
	$t = \frac{PD}{2(SE+PY)}$	$=\frac{30}{2 \times ((20,000))}$	x 3.5 x 0.9 )+( 30 x	$\frac{105}{0.4}$ = $\frac{105}{34,024}$	<del></del> + 0.028
	2(SE+P1)	2 X (( 20,000	x 0.9 )+( 30 x	0.4 )) 34,024	
	t = Required Minim	num Thickness =	0.0311		
Based on the	e above calculation, this pipe	meets the required min	numum thickness for	continued service at	the current
pressure.					
	st = Structural Min	imum Thickness = _	0.1000		
		imum Thickness			
		_			
This pipe me		m thickness based on co	arbon pipe		
This pipe me	Structural minimule eets the required Structural I	m thickness based on co	arbon pipe		
	Structural minimule eets the required Structural I	m thickness based on co	r continued service.		
Corrosion Ra	Structural minimule eets the required Structural Mate: initial - t-actual	m thickness based on co	r continued service.	0.0066 Inches Pe	er Year
Corrosion Ra	Structural minimum eets the required Structural Mate:	m thickness based on co	r continued service.	0.0066 Inches Pe	er Year
Corrosion Ra t-i years betw	eets the required Structural Mate: initial - t-actual ween t-initial & t-actual	m thickness based on co	r continued service.	0.0066 Inches Pe	er Year
Corrosion Ra	eets the required Structural Mate: initial - t-actual ween t-initial & t-actual	m thickness based on co	r continued service.	0.0066 Inches Pe	er Year
Corrosion Rate	Structural minimum eets the required Structural Mate: initial - t-actual ween t-initial & t-actual Half Life:	m thickness based on co	r continued service.  = \frac{0.0330}{5} =		
Corrosion Ra t-i years betw Remaining H t-actual - t-	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life:  -minimum / 2 = 0.1830 -		r continued service.  - = \frac{0.0330}{5} =	0.0066 Inches Pe	
Corrosion Rate	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life:  -minimum / 2 = 0.1830 -	## thickness based on continuous Thickness for ### 0.2160 - 0.1830   5   0.0311	r continued service.  - = \frac{0.0330}{5} =		
Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life:  -minimum / 2 = 0.1830 -	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Rate  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Rate  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Rate  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Rate  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	m thickness based on communication of the communic	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Rema	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life:  -minimum / 2 = 0.1830 - 0.00  on the above corrosion rate a	Minimum Thickness for $ \frac{0.2160 - 0.1830}{5} $ $ \frac{0.0311}{0.66} / 2 = \frac{0.152}{0.006} $ and half life calculation	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Remainspection: Man	aining Half Life
Corrosion Ra  t-i years betw  Remaining H  t-actual - t- Corrosio  Based	eets the required Structural Mate:  initial - t-actual ween t-initial & t-actual Half Life: -minimum on Rate  / 2 = 0.1830 - 0.00	Minimum Thickness for $ \begin{array}{c} 0.2160 - 0.1830 \\ \hline 5 \end{array} $ $ \begin{array}{c} 0.0311 \\ 0.66 \end{array} $ / 2 = $\begin{array}{c} 0.151 \\ 0.006 \end{array}$ and half life calculation	arbon pipe  r continued service. $ = \frac{0.0330}{5} = \frac{19}{66} \div 2 = 23.0 / 2$	= 11.5 Years Remainspection: Man	aining Half Life

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

ocation	Leroy-Ostrander	Equip. #	N/A	Insp. Date	3/9/2017
	Media Center	Description	Media Cer	ter 4" Spot-check	
		Inspection Inform	nation		
Pipe Size		4	<b>D</b> = Outside Diam	eter	4.5
Material		A106B	<b>S</b> = Allowable Stre	ess Value	20,000
Current Inspe	ection Year	2017	<b>P</b> = Design Pressu	re	30
Initial or Prev	vious Thickness Reading Year	2012	<b>E</b> = Joint Efficience	y (seamless E=1)	0.9
API 570 Inspe	ection Interval	5	<b>W</b> = Weld Strength	Reduction Factor	1.0
Initial Thickn		0.237	(W=1 unless temp		
Actual Thickr	ness	0.236	Y = Temperature	Factor	0.4
		Calculation Inform	nation		
Minimum Th	nickness Calculation:				
	$t = \frac{PD}{a(a - a)}$	$= \frac{30}{2 \times ((20,000 \times )^{-3})}$	x 4.5	<u> 135</u>	-+ 0.029
	2(SE+PY)	2 x (( 20,000 x	0.9 )+( 30 x 0	.4 )) 34,024	
	t = Required Minin	num Thickness =	0.0330		
	t – Required Million	- Indiri Tillekiless	0.0000		
	e above calculation, this pipe	meets the required minu	mum thickness for co	ntinued service at th	ne current
pressure.					
	st = Structural Min	imum Thickness =	0.1000		
		m thickness based on carb			
	Structurar minimu	iii tiiitkiitss bustu oii tuib			
This pipe me	eets the required Structural 1	Minimum Thickness for c			
	eets the required Structural I	Minimum Thickness for c			
Corrosion Ra	ate:		continued service.		
Corrosion Ra	ate:		continued service.		
Corrosion Ra	ate:		continued service.	0.0002 Inches Per	Year
Corrosion Ra			continued service.	0.0002 Inches Per	Year
Corrosion Ra t-i years betv	initial - t-actual ween t-initial & t-actual		continued service.	0.0002 Inches Per	Year
Corrosion Ra t-i years betv Remaining H	initial - t-actual ween t-initial & t-actual Half Life:	. <u>0.2370 - 0.2360</u> 5	= 0.0010 =		
Corrosion Ra t-i years betv Remaining H t-actual - t-	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 -	0.2370 - 0.2360 5	= 0.0010 = -÷ 2 = ##### / 2 =		
Corrosion Ra t-i years betv Remaining H	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 -	0.2370 - 0.2360 5	= 0.0010 = -÷ 2 = ##### / 2 =		
Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ra t-i years betw Remaining H t-actual - t- Corrosio	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 -	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Laborated Remaining Hotel Corrosion Based	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Corrosion Ration R	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Laborated Remaining Hotel Corrosion Based	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Laborated Remaining Hotel Corrosion Based	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Laborated Remaining Hotel Corrosion Based	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Corrosion Ration R	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Laborated Remaining Hotel Corrosion Based	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remai	ning Half Life
Corrosion Ration Services Laborated Remaining Hotel Corrosion Based	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - on Rate / 0.00  on the above corrosion rate a	$\frac{0.2370 - 0.2360}{5}$ $\frac{0.0330}{002} / 2 = \frac{0.2030}{0.0002}$ and half life calculation, t	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remain	ning Half Life
Corrosion Ra  t-i  years betw  Remaining H  t-actual - t-  Corrosio	initial - t-actual ween t-initial & t-actual Half Life: -minimum / 2 = 0.2360 - 0.00	0.2370 - 0.2360 5  0.0330 / 2 = 0.2030 0.0002  and half life calculation, t	= 0.0010 = -÷ 2 = ##### / 2 =	507.6 Years Remain	ning Half Life

## Media Center



Media Center Testing Location

Classroom 101			

Facility Leroy-Ostrander Line No. N/A	P&ID No. (First & Las	st):	Status A Regulated By:	0	spection Interval (y wner X API	rs) 5 PSM
Description Classroom Heater			Insulated Vibration:	0% Light X	Underground Moderate	Heavy
Location Classroom 102			Previous Failure Dead Leg		Sand Producing Injection Point	
Service (Oil, Gas, Etc.) Steam	Sour Servi	ice 🔲	Air to Ground		Corrosion Coup	on $\square$
Fabrication Code B 31.	Piping Class (1,2,3	,4) 4	Over Water		Anodes	
Comments			Inspection Type:		Full Part	ial UT/VT X
			Other (Specify)			
To be completed in the field (The	e following conditions apply to	equipment	listed above):			
N/A No areas of concern noted duri	ng physical inspection.					
	Light (surface rust, no scaling o	r pitting).				
	Moderate (pit depth not greate		/light scale).	Pi	t Scale	
<u> </u>	Extreme (pit depth greater tha	n C.A./heav	y scale).	Pit	Scale	
N/A Visual Examination of existing v				Satisfa	ctory	Unsatisfactory
N/A Non-typical fittings/component	ts in service (see comments).					
N/A Condition of insulation:		G	ood	Fair		Poor
X Condition of supports/restraint N/A Condition of coating (see comm		G	 ood	X Satisfa Fair		Unsatisfactory Poor
UT II Tech:	ric Espe			In	spection Date:	3/9/2017
To be completed in the office:  N/A RT Performed.	% RT					
x UT Readings Taken.	60 % UT Taken	In	accessible	Insulat	ced	Not Required
NA Other NDE.	% Other		_	Type (	LFET, PT, MT, Etc.)	
N/A Engineering evaluation request		gn pressure	requirements			
	ime of inspection					
2.						
3. 4.						
5.						
6.						
7.						
8.						
9. 10.						
10.				Resp.	Govn.	Action Code
Action Items				Dept.	By Mand	Rec 1 2 3
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2.					닏	
3. 4.					H	님 님님님
5.					—— H	H H H
6.			•		H	H
7.					—— H	H H H H
8.						
9.						
10.						
Final Review:					Review	
Authorized UTII Tech: Exic Espe		_			Date:	3/24/2016

										SHEET 1	of <u>1</u>
FACILITY	Y		Leroy-Ostrander	School		LIN	E NO.	N/A	INSPECTION	DATE	3-9-17
LOCATIO	ON		Leroy-Ostrander	M	ain 101		-		PAINT/INSUL	ATION	None
DESCRI	PTION			Cla	ssroom	Heater				Eric	Espe
REMARK	S (Insp.	Method,	Equip. Type, Serial No	o., Etc.)	U	TT, Olyı	mpus 38 DL 1	Plus - S/N 12040	6903, Panametr	ics <b>D790 - S</b> /	N 902401
DESN.		LOC.			0.75	NOM.	12:00	3:00	6:00	9:00	
PRES.	SPEC.	NO.	COMP. TYPE Nipple	MATL. <b>A106B</b>		THICK <b>0.113</b>	-		0.107	_	
30	N/A	2	45	A106B		-	0.130	+ -	-	-	1
30	N/A	3	45 CTN	A106B	3/4''	-	N/A	N/A	N/A	N/A	
30	N/A N/A	5	45 CTN 45	A106B		- 0.112	N/A	N/A	N/A	N/A	
30	N/A	5	45	A106B	3/4	0.113	0.130	-	-	-	
1								+	+		+
											1
+											
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+											1
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1	1								1		1
+											
		~	. ** . *	IINT/A II	41		1	<u> </u>	1 0	<u> </u>	111
Commer	nts:	C	omponents listed a	ıs "N/A" a			ed, contain ex Components		ometry or othery	vise not acce	ssible.
					1	m caucu	Components	•			

Signature UTII Tech. Etic Espe

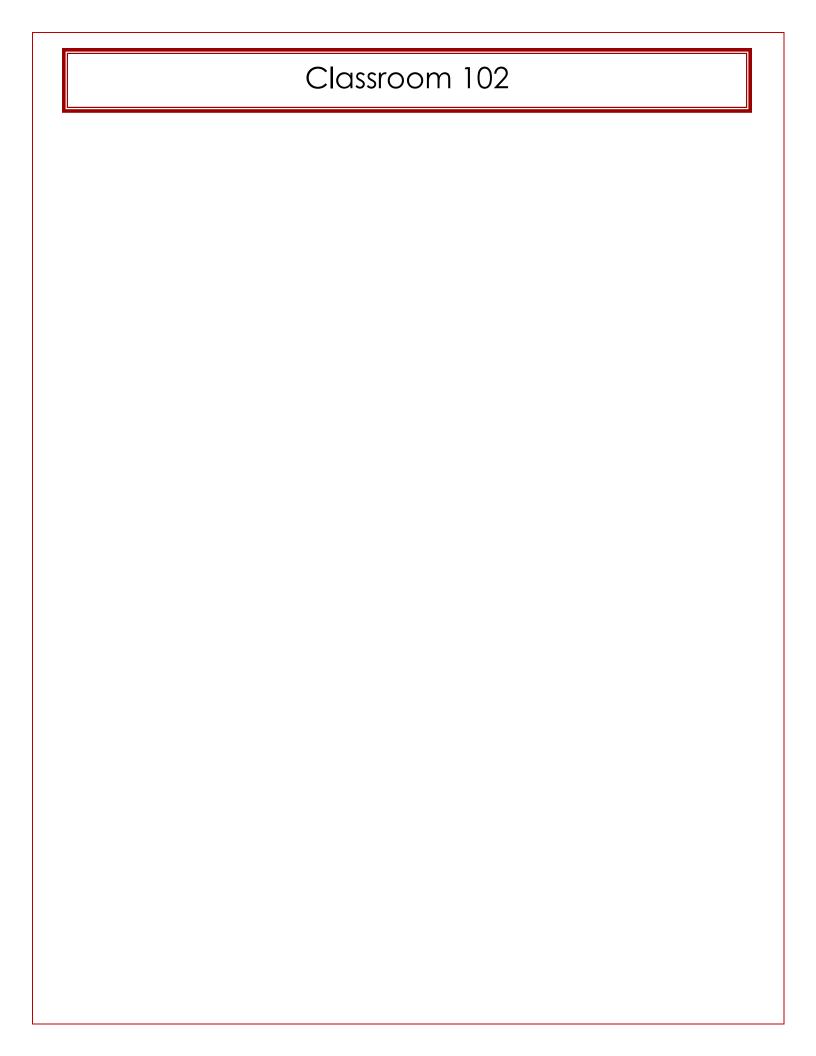
Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

	roy-Ostrander	Equip. #		Insp. Date	3/9/2017
ocation 1938 Class	6 KOOM 1U1	Description		ssroom Heater	
		Inspection Infor			
Pipe Size		0.75	<b>D</b> = Outside Dia		1.1
Material		A106B	<b>S</b> = Allowable S		20,000
Current Inspection Year	D II V	2017	P = Design Pres		30
Initial or Previous Thickne API 570 Inspection Interva	_	2012 5	<b>E</b> = Joint Efficie		0.9
Initial Thickness	aı	0.113		gth Reduction Factor mp. above 800°F)	1.0
Actual Thickness		0.107	Y = Temperatur		0.4
7 tetaar Tillettiess			-		0.1
Minimum Thickness Calcu	ulation:	Calculation Infor	mation		
		20	4.05	24.5	
t =	2(SF+PV)	$= \frac{30}{2 \times ((20,000))}$	X 1.05	$\frac{10.4 }{10.4 } = \frac{31.5}{34.024}$	<del></del>
	2(32111)	2 X (( 20,000	x 0.5 /1( 50 x	0.4 // 54,024	
t =	Required Minim	um Thickness =	0.0149		
		•			
Based on the above calcupressure.	ulation, this pipe i	meets the required min	umum thickness for	continued service at t	the current
•					
<i>st</i> =	Structural Mini	mum Thickness =	0.0900		
St	tructural minimun	n thickness based on car	bon pipe		
		<b></b>			
This pipe meets the requ	iired Structural M	Iinimum Thickness for	continued service.		
This pipe meets the requ	nired Structural M	<b>Iinimum Thickness for</b>	continued service.		
Corrosion Rate:					
Corrosion Rate:				0.0012 Inches Pe	r Year
Corrosion Rate:		1		0.0012 Inches Pe	r Year
Corrosion Rate: t-initial - t-actu years between t-initial				0.0012 Inches Pe	r Year
Corrosion Rate:				0.0012 Inches Pe	r Year
Corrosion Rate:  t-initial - t-actu years between t-initial Remaining Half Life:	ual =	0.1130 - 0.1070 5	= 0.0060 =		
Corrosion Rate: t-initial - t-actu years between t-initial	ual =	0.1130 - 0.1070 5	$= \frac{0.0060}{5} = \frac{1}{5} \div 2 = 76.7 / 2$		
Corrosion Rate:  t-initial - t-actu years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-actu years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate	aal	0.1130 - 0.1070 5	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-acturate years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate  Based on the above	aal	$\frac{0.1130 - 0.1070}{5}$ $\frac{0.0149}{12} / 2 = \frac{0.0923}{0.0013}$	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life
Corrosion Rate:  t-initial - t-actu years between t-initial Remaining Half Life:  t-actual - t-minimum Corrosion Rate	aal	0.1130 - 0.1070 5  0.0149 / 2 = 0.0923 0.0012  nd half life calculation,	$= \frac{0.0060}{5} = \frac{1}{2} \div 2 = 76.7 / 2$	= 38.4 Years Rema	ining Half Life

## Classroom 101



101 Testing Location



Facility Line No.	Leroy-Ostrander N/A	P&ID No. (First & Las	;t):	Status A Regulated By:		Inspection Interval ( Owner X API	· · ·
Description	Classroom Heater			Insulated	0%	Underground	
Location	Classroom 102			Vibration: Previous Failure Dead Leg	Light	<ul><li>Moderate [</li><li>Sand Producin</li><li>Injection Point</li></ul>	Heavy g/High Velocity ·
Service (Oil, G Fabrication Co Comments		Sour Servi Piping Class (1,2,3		Air to Ground Over Water Inspection Type: Other (Specify)		Corrosion Cou Anodes	
To be compl	eted in the field (The	following conditions apply to	equipment l	isted above):			
N/A No areas X External  N/A Visual Ex  N/A Non-typi  N/A Conditio  X Conditio	s of concern noted durin  Corrosion:  X Li  N  Examination of existing we	g physical inspection. ght (surface rust, no scaling o floderate (pit depth not greate streme (pit depth greater that elds (see comments): in service (see comments). (see comments)	r pitting). er than C.A./ n C.A./heavy Go	light scale).	Fair	Pit Scale Scale sfactory sfactory	Unsatisfactory  Poor  Unsatisfactory Poor
UT II Tech:	Era	ic Espe				Inspection Date:	3/9/2017
N/A Engineer	ings Taken.  DE.  Is measurements are less  Ting evaluation requeste			requirements		lated e (LFET, PT, MT, Etc.)	Not Required
Comments: 2.	1. Leaking steam va	lve					
3.							
4.							
5.							
6.							
7.							
9.							
10.							
Action Items					Resp. Dept.	Govn. By Mand	Action Code Rec 1 2 3
	nd or replace leaking val	ve			Maint.	L-OX	
2.						📮	
3.						닏	
4.						닏	
5.						· 片	님 님님
6. 7.						· 片	片 片片片
8.				-		·	+ ++
9.						·	H
10.						·	H H H
						<u> </u>	
Final Review: Authorized U	TII Tech: Eric Espe		_			Review Date:	3/24/2016

										SHEET 1	of <u>1</u>
FACILIT)	Y		Lerov-Ostrander	School		LIN	E NO.	N/A	INSPECTION	DATE	3-9-17
LOCATIO			Leroy-Ostrander	M	ain 102				PAINT/INSUL	ATION	None
DESCRI	PTION			Cla	ssroom	Heater			TECHNICIAN	Eric	Espe
REMARK	(S (Insp	Method	Fauin Type Serial No	Etc.)	UTT, Olympus 38 DL Plus - S/N 12040				6903 Panametr	ics D790 - S/	N 902401
	(		_qa.p , po, coa	o., =.o.,		11, Oly	inpus 50 DE 11	Nus 5/1(120-10)	5703, I dildilicti	RES D 170 DI	11702401
		100		1		NOM.	10.00		1 000		T
DESN.	0050	LOC.	00145 71/55		CIZE	THICK	12:00	3:00	6:00	9:00	
	SPEC.		COMP. TYPE	MATL. <b>A106B</b>		0.113	0.109		0.110	0.111	
30	N/A N/A	2	Nipple 45	A106B		-	0.109 N/A	N/A	N/A	N/A	
30	N/A	3	Nipple Nipple	A106B		0.113	0.103	- IV/A	0.103	- IV/A	
30	N/A	4	Nipple	A106B	3/4''	0.113	0.104	-	0.104	_	†
30	N/A	5	45	A106B	3/4''		-	-	0.121	-	
30	N/A	6	Nipple	A106B		-	N/A	N/A	N/A	N/A	
30	N/A	7	90	A106B		0.113	-	-	0.133	-	
30	N/A	8	Nipple	A106B	3/4''	0.113	N/A	N/A	0.106	0.109	
	1							1			
								+			<del>                                     </del>
	1							+	+		+
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Commer	nts:	C	omponents listed a	ıs ''N/A'' a				essive part geo	metry or othery	vise not acce	ssible.
					T	hreaded	Components				

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Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

Facility Location 1938	Leroy-Ostrander Class Room 102	Equip. #	N/A	Insp. Date lassroom Heater	3/9/2017
Pipe Size Material Current Inspection Y Initial or Previous Th API 570 Inspection II Initial Thickness Actual Thickness	nickness Reading Year	0.75 A106B 2017 2012 5 0.113 0.104	<ul> <li>D = Outside D</li> <li>S = Allowable</li> <li>P = Design Pre</li> <li>E = Joint Effici</li> <li>W = Weld Stre (W=1 unless</li> <li>Y = Temperate</li> </ul>	Stress Value essure ency (seamless E=1) ngth Reduction Factor temp. above 800°F)	1.1 20,000 30 0.9 1.0
Minimum Thickness	= PD 2(SE+PY)	$= \frac{30}{2 \times ((20,000))}$ sum Thickness	x 1.05 x 0.9 )+( 30	$\frac{31.5}{34,024}$	<del></del> + 0.014
pressure.	= Structural Mini Structural minimun	meets the required minimum Thickness = In thickness based on car Inimum Thickness for	0.0900 bon pipe	r continued service at	the current
t-initial - 1 years between t-i Remaining Half Life:	:	$\frac{0.1130 - 0.1040}{5}$ $\frac{0.0149}{18} / 2 = \frac{0.0891}{0.0018}$	L_ ÷ 2 = 49.5 / :		
Based on the a	above corrosion rate a	nd half life calculation,	this pipe is due for	inspection: Man	r 2022
	Eric Es <sub>l</sub>	ne			3/9/2017

VT/UT II Tech. Signature

Date

## Classroom 102



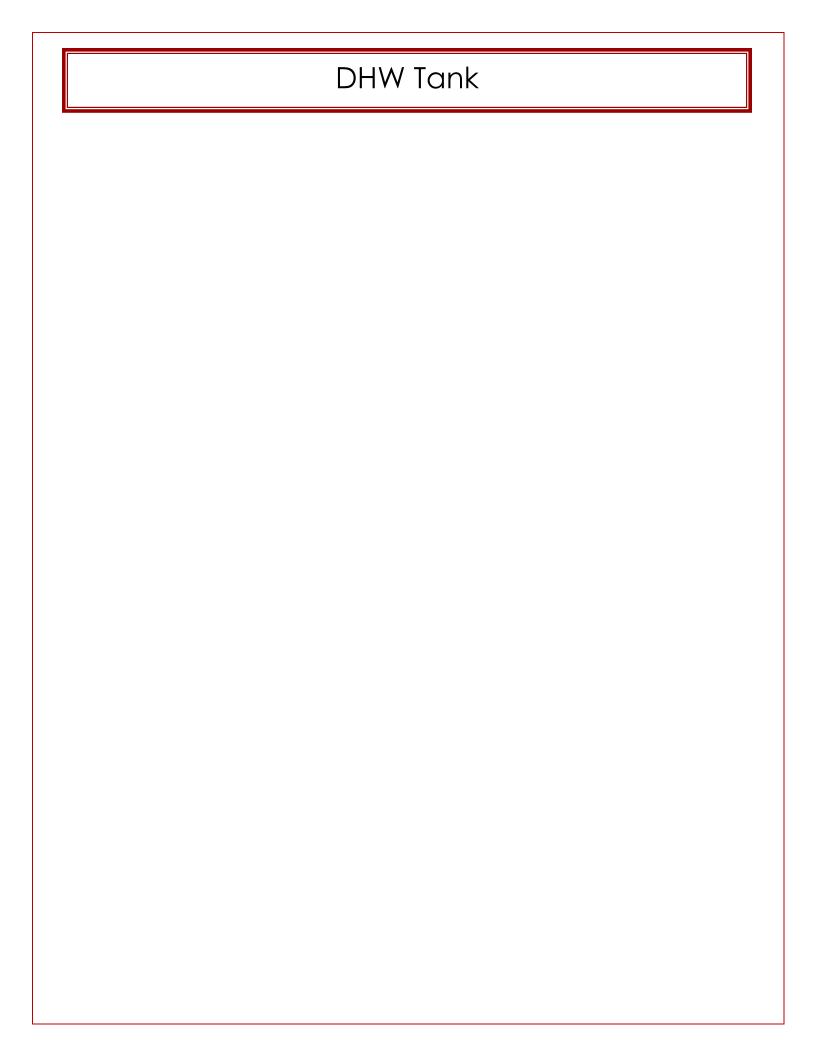
102 Leaking Valve

Description   Classroom Heater   Insulated   O%   Underground   Heat   Classroom Heater	у у
Fabrication Code Comments    Piping Class (1,2,3,4)   4   Over Water     Anodes     Inspection Type:   Other (Specify)     Partial   UT/A     UT/A	y y
N/A No areas of concern noted during physical inspection.  X External Corrosion: X Light (surface rust, no scaling or pitting).  Moderate (pit depth not greater than C.A./light scale).  Extreme (pit depth greater than C.A./heavy scale).  Pit Scale  Extreme (pit depth greater than C.A./heavy scale).  N/A Visual Examination of existing welds (see comments):  N/A Non-typical fittings/components in service (see comments).  N/A Condition of insulation:  Good Fair Poor  X Condition of supports/restraints (see comments):  X Satisfactory Unsatisfactor  N/A Condition of coating (see comments):  Good Fair Poor  UT II Tech: Exic Espe Inspection Date: 3/9/2017  To be completed in the office:  N/A RT Performed.  X UT Readings Taken.  100 % UT Taken Inaccessible Insulated Not Required Not Required Notes of Supports of Suppor	у
X Light (surface rust, no scaling or pitting).  Moderate (pit depth not greater than C.A./light scale).  Extreme (pit depth greater than C.A./light scale).  Extreme (pit depth greater than C.A./heavy scale).  N/A Visual Examination of existing welds (see comments):  N/A Non-typical fittings/components in service (see comments).  N/A Condition of insulation:  Good  Fair  Poor  X Condition of supports/restraints (see comments)  N/A Condition of coating (see comments):  Good  Fair  Poor  UT II Tech:  Exic Espe  Inspection Date:  3/9/2017  To be completed in the office:  N/A RT Performed.  X UT Readings Taken.  MO Other  NOB.  WOther  NOB.  WOther  NOB.  WOther  NOB Other  NOB	у
N/A Condition of coating (see comments):  UT II Tech:  Exic Espe  Inspection Date:  3/9/2017  To be completed in the office:  N/A RT Performed.  UT Readings Taken.  100 % UT Taken  Inaccessible  Insulated  Not Required  NA Other NDE.  NA Other NDE.  N/A Thickness measurements are less than minimum to meet design pressure requirements  N/A Engineering evaluation requested (see comments).  Comments:  1. None noted at time of inspection	
To be completed in the office:  N/A RT Performed.	1
N/A RT Performed.	l
3. 4. 5. 6.	
7.	
8. 9. 10. Resp. Govn. Action	n Code
	3
1.	
6.	
Final Review:  Review  Authorized UTII Tech: Exic Espe  Date: 3/24/2016	

										SHEET 1	of <u>1</u>	
FACILITY	FACILITY Leroy-Ostrander School						E NO.	N/A	INSPECTION DATE 3-9-1			
FACILITY Leroy-Ostrander School LOCATION M									PAINT/INSULATION None			
DESCRI	PTION			Cla	ssroom	Heater			TECHNICIAN Eric Espe			
REMARKS (Insp. Method, Equip. Type, Serial No., Etc.) UTT, Olympus 38 DL Plus - S/N 120406903, Panametrics D790 - S/N 90240											N 902401	
DESN.		LOC.				NOM.	12:00	3:00	6:00 9:00			
PRES.	SPEC.	NO.							0.100   0.098			
	14/11	_	Tuppie	111002	1/2	0.110	0.102		0.100	0.050		
									+			
1												
Comments: Components listed as "N/A" at heights, covered, contain excessive part geometry or otherwise not accessible.												
Threaded Components												
	Signature UTII Tech. Exic Espe											

Minimum Required Thickness, Long Term Corrosion Rate and Remaining Life Calculations

	oy-Ostrander	Equip. #		Insp. Date	3/9/2017
ocation 1950 Class	Room 201	Description	Cla	ssroom Heater	
		Inspection Infor	mation		
Pipe Size		0.75	<b>D</b> = Outside Diag	meter	1.1
Material		A106B	<b>S</b> = Allowable St	tress Value	20,000
Current Inspection Year		2017	<b>P</b> = Design Press		30
Initial or Previous Thickne	_	2012	<b>E</b> = Joint Efficier	=	0.9
API 570 Inspection Interva	al	5	_	th Reduction Factor	1.0
Initial Thickness		0.113		mp. above 800°F)	0.4
Actual Thickness		0.098	Y = Temperatur	e Factor	0.4
		Calculation Infor	mation		
Minimum Thickness Calcu	ulation:				
	20	20	4.05	24.5	
t =	2/SE+DV)	$= \frac{30}{2 \times ((20,000))}$	X 1.05	$\frac{31.5}{0.4 \text{ N}} = \frac{31.5}{34.034}$	<del></del>
	2(36+21)	2 X (( 20,000	x 0.9 )+( 30 x	0.4 )) 34,024	
t =	Required Minim	num Thickness =	0.0149		
	•	-			
Based on the above calcu	ılation, this pipe	meets the required min	umum thickness for o	continued service at t	the current
pressure.					
st =	Structural Mini	mum Thickness =	0.0900		
		mum Thickness = m thickness based on car			
St	tructural minimun	m thickness based on car	bon pipe		
	tructural minimun	m thickness based on car	bon pipe		
St	tructural minimun	m thickness based on car	bon pipe		
This pipe meets the requirement Corrosion Rate:	tructural minimun	n thickness based on car	continued service.		
This pipe meets the requ Corrosion Rate:	tructural minimun	n thickness based on car	continued service.	0.0030 Inches Pe	er Year
This pipe meets the requ Corrosion Rate:	tructural minimun	m thickness based on car	continued service.	0.0030 Inches Pe	er Year
This pipe meets the requipment of the control of th	tructural minimun	n thickness based on car	continued service.	0.0030 Inches Pe	er Year
This pipe meets the requirement Corrosion Rate:	tructural minimun	n thickness based on car	continued service.	0.0030 Inches Pe	r Year
This pipe meets the requirements of the requir	ired Structural N	n thickness based on car  Minimum Thickness for  0.1130 - 0.0980  5	continued service.  = \frac{0.0150}{5} =		
This pipe meets the requirements the requirements the requirements the requirements of	tructural minimun  ired Structural M  ial  & t-actual  2 = 0.0980 -	10.1130 - 0.0980 5  0.0149 / 2 = 0.0832	continued service. $= \frac{0.0150}{5} = \frac{1}{5} \div 2 = 27.7 / 2$		
This pipe meets the requirements of the requir	ired Structural N	10.1130 - 0.0980 5  0.0149 / 2 = 0.0832	continued service. $= \frac{0.0150}{5} = \frac{1}{5} \div 2 = 27.7 / 2$		
This pipe meets the requirements the requirements the requirements the requirements of	tructural minimum  tructural mi	10.1130 - 0.0980 5  0.0149 / 2 = 0.0832	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	
This pipe meets the requirements the requirements the requirements the requirements of	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements the requirements the requirements the requirements of	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	m thickness based on car  Minimum Thickness for	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Rema	ining Half Life
This pipe meets the requirements of the requir	tructural minimum  tructural mi	In thickness based on car Minimum Thickness for $ \begin{array}{c cccc} 0.1130 & - & 0.0980 \\ \hline & 5 & & & \\ \hline 0.0149 & / & 2 & = & 0.0833 \\ \hline 0.0030 & & & & \\ \end{array} $ and half life calculation,	continued service. $= \frac{0.0150}{5} = \frac{1}{0} \div 2 = 27.7 / 2$	= 13.8 Years Remanspection: Mar	ining Half Life



#### **POET Biorefining**

## TANK THICKNESS MEASUREMENTS (inches)

										;	SHEET <u>1</u> o	of <u>1</u>				
	FACILITY Leroy-Ostrander School					LINE NO. N/A				INSPECTION DATE		3-9-17				
	FACILITY Leroy-Ostrander School LOCATION Boil DESCRIPTION Stora					er Room				PAINT/INSULATION		None				
	DESCRIPTION Stora						k - DHW	7		TECHNICIAN	Eric	Espe				
	REMARKS (Insp. Method, Equip. Type, Serial No., Etc.)					T I'	TT. Olvn	nnus 38 DL. Pl	lus - S/N 12040	6903 Panametr	rics D790 - S/	N 902401				
	NEWANNO (IIISP. Metriou, Equip. Type, Serial No., Etc.)						i i, Oiyii	ipus 50 DL 11	143 - 5/11 120-10	,0000,1 animietries 2.190 5,11902101						
	DESN.		LOC.				NOM.	12:00	3:00	6:00	9:00					
CODE		SPEC.			MATL.	SIZE	THICK		1 0.00	0.00		ļ				
N/A	30	N/A	1	Head 1	A36	60''		0.615	-	-						
N/A	30	N/A	2	Head 1	A36	60''	0.625	0.618	-	-						
N/A	30	N/A	3	Head 1	A36	60''	0.625	0.625	-	-						
N/A	30	N/A	4	Course 1	A36	60''	0.500	0.450	-	-	0.429					
N/A	30	N/A	5	Course 2	A36	60''	0.500	0.451	-	-	0.447					
N/A	30	N/A	6	Head 2	A36	60"	0.625		-	-	0.615					
N/A	30	N/A	7	Head 2	A36	60"	0.625		-	-	0.622					
N/A	30	N/A	8	Head 2	A36	60''	0.625	-	-	-	0.625					
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									1	+						
	Comme	nte•	Co	mnonente lietad oe	! : ''N/A'' of	height	c covere	d contain ev	Pessive part so	metry or other	wise not acco	ecible				
	Comments: Components listed as "N/A" at heights, covered, contain excessive part geometry or otherwise not accessible.  Damaged Insulation Throughout											BBIDIC.				
						Damaş	scu msul	anon inroug	nout							

Signature UTII Tech. Eric Espe

QC Form-Thickness Measurement (Piping)

## DHW Tank



Damaged Insulation