

STORAGE TANK INSPECTION REPORT

Date: Sept. 19, 2012

Equipment ID:

Plant	Minehead Compressor Station	Op Unit	6614 6030		System	
Asset #	222098	Equipment ID			Asset Type	
Description	400 BBL Produced Water Tank	Serial #	006782	Year Built	2003	
Manufacturer	Nusco					
Code	API-12F Modified	Fluid Service	Produced Water	Sour	MDMT	°C
Internal Access	Yes	Insulated	Yes	Internal Coating	Devoe 253	

PSV / VACCUM BREAKER DATA

PSV ID #	Location	Size		Set Pressure	Capacity SCFM / Lbs/Hr / GPM	Manufacturer	Model	Last Service
		Inlet	Outlet					

INSPECTION SUMMARY

The storage tank had previously been used as a produced water tank and has been out of service for several years. Operations intended to return the tank into service and use it for methanol storage at the Minehead Compressor Station.

There was no safety chain or bar present at the top of the ladder to the walkway platform.

There were isolated areas of internal coating damage along the bottom shell, manway cover and the heating coil. Coating repairs were performed on the shell and manway, but the heating coil was to be removed prior to the tank going into service.

There were isolated areas of moss growing along the bottom of the insulation cladding.

RECOMMENDATIONS

The heating coil was to be removed prior to putting the tank into service.

A safety chain or bar should be installed at the top of the roof access ladder.

All of the moss growing along the bottom of the insulation cladding should be removed in order to help prevent corrosion under the insulation.

NONCONFORMANCES / INSPECTION DEFICIENCIES

INSPECTION PLANNING

Inspection Strategy	Availability	Inspection Interval	5 yrs
Inspection Date	Sept. 19, 2012	Date of Last Inspect	9-18-2017

REPORT CERTIFICATION

The signatures below certify that inspections/tests have been completed in accordance with the identified inspection strategy and that the specified equipment is considered fit for service until the date of next inspection.

Inspected by	Adam Fitzgerald	Date	Oct. 29, 2012
Reviewed and Approved by	Pascal De Montigny	Date	12-18-2012
Criticality Assessment Rerun	API 653 # 32496	Inspection Planning Rerun	
Assessed Next Inspection Date			

Detailed Inspection Visual External

ID	General	Condition
T1	Other (please explain)	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
Operations stated that all of the external piping would be replaced prior to putting the tank into service.		
T2	Corrosion	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T3	Leaks	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
T4	Vibration	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
T5	Dissimilar Flange Rating	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
T6	Ladder/Stairway	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
The ladder was secure and in good condition, but there was no safety chain or bar located at the top of the ladder.		
T7	Platform	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T8	Electrical Ground	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T9	Cathodic Protection	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
There were two internal anodes present and they both appeared to be properly installed.		
T10	Painted Inactive Corrosion	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T11	Coating/Painting	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T12	Level Gauge	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T13	Bottom	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
The tank has a double floor.		
T14	Secondary Containment	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T15	Shell	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
The tank is double walled		
T16	Roof	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T17	Agitator/Mixer	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T18	Jacket	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A

ID	Supports	Condition
T31	Other (please explain)	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
The tank is welded to a metal skid that is welded to support piles.		
T32	Foundation	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T33	Anchor Bolts	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T34	Windgirders	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A

SUMMIT Inspection Services Ltd.

ID	Connections	Condition
T41	Other (please explain)	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T42	Small Branches	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T43	Nozzles	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T44	Swing Lines	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T45	Manways/Hatches	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T46	Reinforcing Pads	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T47	Inadequate Thread Engagement	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T48	Bolting	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T50	Flanges	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T51	Leak Clamps	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
	Insulation	Condition
T61	Other (please explain)	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T62	Damage	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T63	Penetrations	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T64	Jacket	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T65	Banding	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
T66	Seals/Joints	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
	Relief Device	Condition
T71	Other (please explain)	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
There were two PVRVs present on the tank that appeared to be in good condition, but there was limited access to the nameplate information.		
T72	Corrosion	<input type="checkbox"/> Good <input checked="" type="checkbox"/> N/A
T73	Leaks	<input type="checkbox"/> Good <input checked="" type="checkbox"/> N/A
T74	Restricted Inlet/Outlet	<input type="checkbox"/> Good <input checked="" type="checkbox"/> N/A

Detailed Inspection Visual Internal

ID	General	Condition
V1	Other (please explain)	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V2	Corrosion	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V3	Erosion	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V4	Distortion	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V5	Blisters	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V6	Deposits	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
There was isolated areas of residue present on the shell, but overall the tank was very clean.		
V7	Welds	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
V8	Nozzles	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
V9	Shell	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
V10	Roof	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
V21	Internals Other (Please explain)	<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
There were two internal anodes present with approximately 50% remaining at the time of inspection.		
V22	Annular Ring	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V23	Sump	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V24	Roof Support	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V25	Thermowells	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
V26	Metallic Linings	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V27	Nonmetallic Linings	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
Coating repairs were performed at the time of inspection in isolated areas of coating damage along the bottom shell, manway cover and flanges. Coating damage on the heating coil was not repaired since the coil was to be removed prior to putting the tank into service.		
V28	Internal Steam Coil or Other Piping	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A
The coil appeared to be in good condition, but was to be removed prior to putting the tank into service.		
V29	Level Gauge	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
V30	Other Welded Attachments	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input checked="" type="checkbox"/> N/A
T11	Floor	<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> N/A

UT Measurements on Bottom Shell Course

UT thickness measurements were taken internally (the tank is double walled) along the bottom shell at four equally spaced locations. The test locations consisted of 12 points, equally spaced over a vertical 18" band. The following table displays the results of the thickness measurements.

Reading	North	East	South	West
1	0.218"	0.209"	0.212"	0.216"
2	0.210"	0.207"	0.210"	0.221"
3	0.206"	0.208"	0.213"	0.219"
4	0.204"	0.210"	0.212"	0.220"
5	0.208"	0.209"	0.218"	0.220"
6	0.214"	0.211"	0.219"	0.220"
7	0.215"	0.214"	0.216"	0.224"
8	0.213"	0.216"	0.215"	0.222"
9	0.215"	0.218"	0.216"	0.217"
10	0.213"	0.220"	0.217"	0.220"
11	0.211"	0.220"	0.218"	0.217"
12	0.211"	0.218"	0.217"	0.205"
Min.	0.204"	0.206"	0.207"	0.205"

Nominal Shell Thickness is 0.188"

UT readings include the coating thickness

UT on Tank Floor

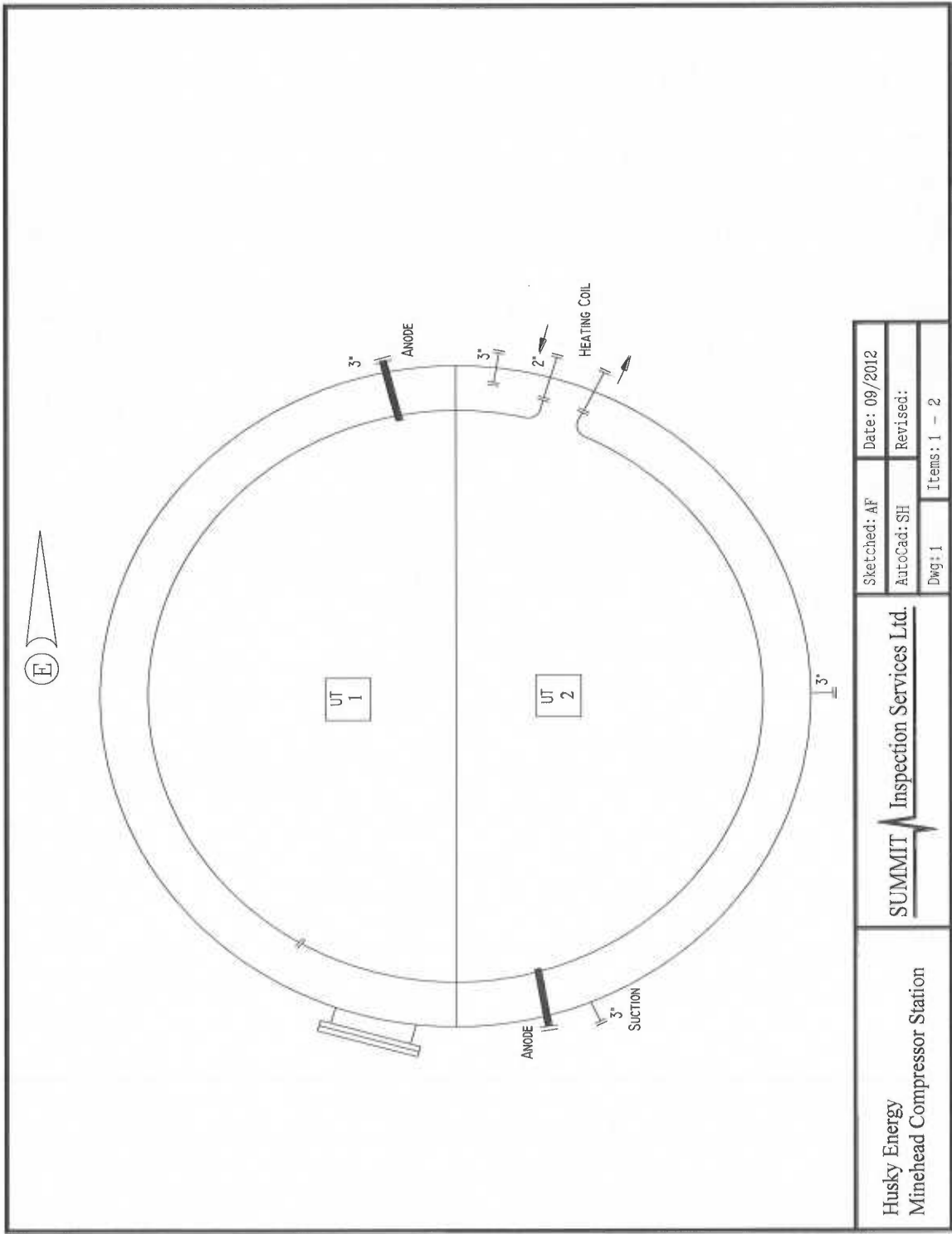
UT thickness scans were performed on each of the internal floor plates (there is a double floor). Each scanned area was approximately 12" x 12", with an average and minimum thickness recorded for each area. Please refer to the attached floor map for the location of each test area.

Location#	1	2
Average	0.280"	0.285"
Min.	0.274"	0.276"

Nominal Floor Thickness is 0.250"

UT readings include the coating thickness

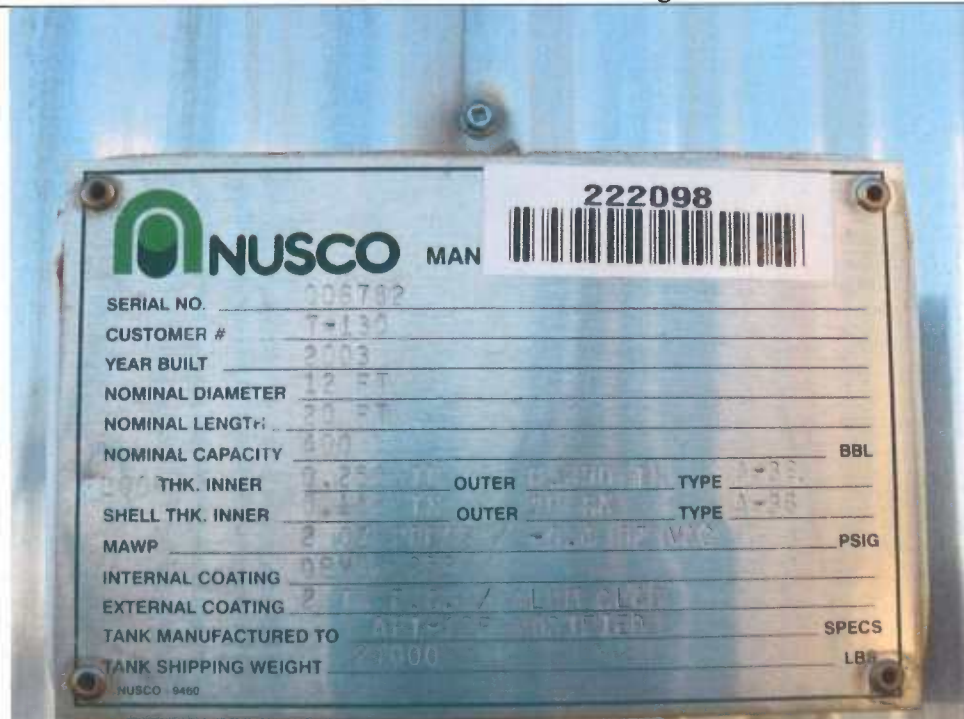
Floor Panel Design



Pictures



General external view of the storage tank



Nameplate



Areas of moss growing along the bottom of the insulation cladding



Internal anode



General internal view of the floor and lower shell



Isolated areas of coating damage along the bottom shell



Internal overflow piping



General view of the tank support system

Cover Page – Atmospheric Storage Tank				
Client:	Husky Energy	Inspection Date:	September 19, 2012	
Facility:	Minehead Compressor Station	LSD:	14-06-049-18 W5M	
Requested By:	Bob Marchak	Serial #:	006782	
Equipment:	400 BBL Produced Water Tank (Surplus)			
Status				
<input type="checkbox"/> In Service <input checked="" type="checkbox"/> Not In Service <input type="checkbox"/> Standby <input type="checkbox"/> Not At location				
Type of Inspection			SISL Technique	
<input checked="" type="checkbox"/> Visual External <input checked="" type="checkbox"/> Visual Internal <input type="checkbox"/> Firetube <input type="checkbox"/> Installation <input checked="" type="checkbox"/> Coating <input type="checkbox"/> Corrosion Survey <input checked="" type="checkbox"/> NDT <input type="checkbox"/> Repair <input type="checkbox"/> Other			SISL-19	
Technicians/Inspectors		Certifications		
Adam Fitzgerald		API-653# 37313 CGSB UT-II# 13474		
Technique				
<input type="checkbox"/> BR <input type="checkbox"/> CN <input type="checkbox"/> CP <input type="checkbox"/> ET <input type="checkbox"/> MT <input type="checkbox"/> PR <input type="checkbox"/> PT <input type="checkbox"/> RT <input type="checkbox"/> TM <input checked="" type="checkbox"/> UT <input checked="" type="checkbox"/> VE <input checked="" type="checkbox"/> VI <input type="checkbox"/> Other				
<input checked="" type="checkbox"/> UT (thickness) <input type="checkbox"/> MPI (dry powder) <input checked="" type="checkbox"/> Visual (external) <input type="checkbox"/> LPI (visible aqueous) <input type="checkbox"/> UT (shearwave) <input type="checkbox"/> MPI (wet fluorescent) <input checked="" type="checkbox"/> Visual (internal) <input type="checkbox"/> LPI (visible post emulsifiable) <input type="checkbox"/> UT (c-scan) <input type="checkbox"/> MPI (wet visible) <input type="checkbox"/> Hardness (microdur) <input type="checkbox"/> LPI (visible solvent removable) <input type="checkbox"/> UT (TOFD) <input type="checkbox"/> RVT <input type="checkbox"/> Hardness (telebrinel) <input type="checkbox"/> LPI (fluorescent water washable) <input type="checkbox"/> UT (phased array) <input type="checkbox"/> Holiday Detection <input type="checkbox"/> Chemical Etching <input type="checkbox"/> LPI (fluorescent post emulsifiable) <input type="checkbox"/> Automated UT <input type="checkbox"/> MFL Floor Scanning <input type="checkbox"/> Weld Joint Vacuum Box <input type="checkbox"/> LPI (fluorescent solvent removable)				
Equipment		Consumables		
Ultrasonic <input checked="" type="checkbox"/> DMS-2 <input type="checkbox"/> USN-52L <input type="checkbox"/> USN-58L <input type="checkbox"/> USN-Phaser <input type="checkbox"/> Westdyne Intraspec 4 Other <input type="checkbox"/> Tinker Razor Holiday Detector <input type="checkbox"/> MFE 4020 MKII		Magnetic Particle <input type="checkbox"/> AC Yoke <input type="checkbox"/> DC Yoke <input type="checkbox"/> Permanent Yoke <input type="checkbox"/> Blacklight Other <input type="checkbox"/> RVT XLG-3 <input type="checkbox"/> Vacuum Box		
		Magnetic Particle <input type="checkbox"/> Magnaflux 7HF (black) <input type="checkbox"/> Magnaflux WCP-2 Contrast Paint <input type="checkbox"/> Magnaflux 14AM Fluorescent Bath <input type="checkbox"/> Red Oxide Powder <input type="checkbox"/> Grey Oxide Powder Other <input type="checkbox"/> Nital Chemical Solution		
		Liquid Penetrant <input type="checkbox"/> SKL-WP Penetrant <input type="checkbox"/> SKD-S2 Developer <input checked="" type="checkbox"/> SKC-S Cleaner <input type="checkbox"/> DP-51 Penetrant <input type="checkbox"/> DR-62 Developer Other <input checked="" type="checkbox"/> Devco 142C		
Ultrasonic Transducers				
Description	Type	Frequency	Diameter	Angle
FH2E	Dual	7.5 MHz	.380"	0 degrees
Magnetic Particle				
Material: _____ Surface: _____ Technique: _____ Lighting: _____				
Code				
Code: ASME V Acc. Criteria: API-653 Calibration: .100" - .500" Stepwedge Sensitivity: BWR @ 80% FSH				
Comments:				
Husky Energy was considering returning this tank into service, so a thorough API-653 inspection was requested for the tank. Please refer to the report for the details of the inspection.				

Signature: _____

Adam Fitzgerald

Date: October 29, 2012