HMT JOB NUMBER:	26281659		
INSPECTION DATES: FROM (MM / DD / YYYY)	**2/14/2023**	TO (MM / DD / YYYY)	**2/15/2023**
RESPONSIBLE API INSPECTOR:	**Aaron Crum**	CERT. NO.:	**88537**

INTERNAL / EXTERNAL INSPECTION: ☒	w/SHELL UT	**Yes ☒ No ☐**	TANK FILES AVAILABLE FOR REVIEW:	**Yes ☐ No ☒**
EXTERNAL ONLY INSPECTION: ☐	w/SHELL UT	**Yes ☐ No ☐**	APPROPRIATE PAPERWORK LEFT ON SITE:	**Yes ☒ No ☐**
INTERNAL ONLY INSPECTION: ☐	w/SHELL UT	**Yes ☐ No ☐**	NUMBER OF SHELL COURSES:	**7**

GENERAL:	TANK NUMBER / IDENTIFICATION:	**North Water Tank**
	OWNER:	**City of Johnstown Municipality**
	CLIENT (IF DIFFERENT THAN OWNER):	**Tanco Engineering**
	TANK LOCATION:	**Johnstown, CO**
	TYPE OF FACILITY (Terminal, Refinery, Etc.):	**Water Treatment Plant**
	MANUFACTURER:	**No Data Available**
	DESIGN STANDARD:	**Unknown**
	PRODUCT PRIOR TO INSPECTION:	**Potable Drinking Water**
	DESIGN SPECIFIC GRAVITY:	**1.0**
	PRODUCT SPECIFIC GRAVITY:	**1.0**
	DESIGN PRESSURE:	**Atmospheric**
	OPERATING TEMPERATURE:	**Ambient**
	CATHODIC PROTECTION & TYPE:	**None**
	NAMEPLATE PRESENT (& Location):	**Yes (Nameplate has been painted over and is not legible)**
	DOT REGULATED:	**No**
	LATITUDE:	**40.3383693**
	LONGITUDE:	**-104.9455472**
DIMENSIONS:	DIAMETER:	**50.0**
	HEIGHT:	**52.0**
	CAPACITY GROSS:	**18,185.10 bbls.**
	OPERATING HEIGHT:	**52.00**
	CAPACITY NOMINAL:	**18,185.10 bbls.**

GEOMETRY:	FOUNDATION:	**Concrete Ringwall**
	BOTTOM:	**Lap Welded**
	SHELL:	**Butt Welded**
	MATERIAL OF CONSTRUCTION:	**Carbon Steel (Grade Not Known)**
	COURSE 1 AVERAGE THICKNESS:	**0.559**
	FIXED ROOF:	**Lap Welded Self-Supporting Dome**
	FLOATING ROOF:	**N/A**
	PRIMARY SEAL:	**N/A**
	SECONDARY SEAL:	**N/A**
DATES:	YEAR OF CONSTRUCTION:	**1966**
	SECOND BOTTOM & DATE INSTALLED:	**N/A**
	LAST COATED:	**No Data Available**
	LAST INSPECTION:	**No Data Available**
ACCESS:	STAIRWAY / ROOF ACCESS:	**Vertical Ladder**
	FLOATING ROOF ACCESS:	**N/A**
COATINGS / LININGS:	BOTTOM & DATE APPLIED:	**External Shell and Dome Roof 2019**
	SHELL:	**External - White Paint** **Internal - Thin-Film Epoxy**
	FIXED ROOF:	**External - White Paint** **Internal - Thin-Film Epoxy**
	FLOATING ROOF:	**Top Side - N/A** **Product Side - N/A**

	Tank Records / History Comments
	The tank owner has limited data available on the tank. The age of the tank was determined by a blueprint drawing of the water treatment facility being constructed and the tank is visible on the drawing tieing into the facilty piping.

Foundation

Item No.	Acceptable	Ref 2.0	N/A	
F1	☐	☒	☐	Condition of foundation support (ref. API 653, Para. 4.5.1).
F2	☐	☒	☐	Perform bottom settlement survey (ref. API 653, Para. B.2.1). (ref. API 653, Para. 12.5.2 - Survey During Hydrostatic Testing & ref. API 650, Para. 7.3.6 – Hydrostatic Testing Requirements) **Note:** Ref. Para. B.2.2.5, If a well-defined rigid tilt plane cannot be determined or the maximum out-of-plane settlement determined in accordance with B.3.2.1 is exceeded, the procedures given in this section may be used in lieu of more rigorous analysis or repair. **5.47** — Planar Tilt / Out-of-Level (inches) **0.56** — Out-of-Plane Settlement / Deflection (inches) **0.51** — Max. Permissible Out-of-Plane Settlement / Deflection (inches)
F3	☒	☐	☐	Identify and measure dimensions of all areas of tank bottom bulges, depressions & settlement (ref. API 653, Paras. B.2.5 & B.3.3).
F4	☒	☐	☐	Identify and measure all areas of internal bottom edge settlement (ref. API 653, Paras. B.2.3 & B.3.4 Figs. B.11 / B.12).
F5	☐	☒	☐	Concrete ringwall free of debris (ref. API 653, Para. 6.3.1).
F6	☒	☐	☐	Concrete ringwall beveled away from tank.
F7	☒	☐	☐	Concrete ringwall free of cracks, breaks, spalling, exposed rebar, etc. (ref. API 653, Para. 4.5.1).
F8	☒	☐	☐	Earth eroded due to water running off the tank (ref. API 653, Paras. 4.4.2 & 6.3.1).
F9	☐	☒	☐	Check for proper drainage and water runoff away from the tank (ref. API 653, Para. C.1.1.5).
F10	☐	☒	☐	Check around the tank and within the dike for build-up of trash and vegetation (ref. API 653, Para. C.1.1.6).
F11	☐	☒	☐	Moisture barrier condition at bottom edge projection to concrete ringwall (ref. API 653, Para. 6.3.1).
F12	☒	☐	☐	Indications of bottom leakage (ref. API 653, Para. 6.3.1).
F13	☒	☐	☐	Cavities or holes around / under tank perimeter (ref. API 653, Paras. 6.3.1 & C.1.1.1).
F14	☐	☐	☒	Check for anchorage. Record sizes, spacing between anchors and condition (ref. API 653, Paras. 4.5.3 & 8.8). Anchor Bolt Size (inches) Chair / Saddle or Strap Type Number of Anchors Spacing measured between Centerlines

Foundation Limitations

F15	☒	☐	☐	List any limitations to the foundation inspection. **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Item No(s)	Additional Inspection Comments
F1 & F5	The concrete ringwall was covered in vegetation along with ice and snow limiting the inspection. ***The vegetation should be removed from the concrete ringwall and up against the tank shell to prevent water from being held under the tank bottom.***
F2	Differential settlement is a good indicator of settlement related to foundation problems. Other indicators are shell deformation, shell out-of-roundness, and bottom edge settlement. Without tank historical data, it cannot be determined if the settlement is active, inactive or the result of the original construction tolerances. ***Settlement should be evaluated at the next 5-year in-service inspection or at the next out-of-service inspection interval when tank records should be reviewed to compare the baseline settlement to the current conditions to determine if tank settlement is active.***
F9	The west side of the tank has the drainage runoff from the roadway sloped at the tank shell and the vegetation along the roadway is up against the tank shell. ***The area around the tank should be regraded to prevent water runoff from sitting on the tank shell or under the tank bottom.***
F10	The tank does not sit in a dike area it sits in an open area. This is noted for information only.
F11	No moisture barrier was observed between the bottom edge projection and the concrete ringwall. ***No repair action is required but consideration should be given to installing an appropriate moisture barrier to seal against water intrusion under the tank bottom.***

HMT Inspection	HMT Job No.	26281659
API 653 Inspection Checklist	Tank No.	North Water Tank

Tank Size	**50.00'**	Design Slope: **Unknown**	Actual Slope:

Bottom Type: ☒ Cone Up ☐ Cone Down ☐ Flat ☐ Shovel Type

(ft.) Profile Measurement Data Form.
Distance between Measurements after Breakover Point toward Tank Center.

Station (ft)	Shell	Breakover R (ft.)	R Reading	B (inches)	Allowable	Type (B_e/B_{ew}/B_α)	In / Out	1'	2'	3'	4'	5'	6'
1	**5.65**							**5.68**	**5.71**	**5.73**	**5.72**	**5.70**	**5.66**
1.5	**5.65**							--	--	--	--	--	--
2	**5.63**							**5.62**	**5.62**	**5.54**	**5.50**	**5.46**	**5.45**
2.5	**5.58**							--	--	--	--	--	--
3	**5.50**							**5.51**	**5.49**	**5.48**	**5.45**	**5.43**	**5.41**
3.5	**5.41**							--	--	--	--	--	--
4	**5.33**							**5.35**	**5.39**	**5.43**	**5.44**	**5.42**	**5.41**
4.5	**5.28**							--	--	--	--	--	--
5	**5.23**							**5.28**	**5.32**	**5.35**	**5.38**	**5.40**	**5.36**
5.5	**5.20**							--	--	--	--	--	--
6	**5.22**							**5.24**	**5.25**	**5.28**	**5.31**	**5.30**	**5.25**
6.5	**5.27**							--	--	--	--	--	--
7	**5.31**							**5.37**	**5.38**	**5.41**	**5.45**	**5.48**	**5.51**
7.5	**5.43**							--	--	--	--	--	--
8	**5.54**							**5.58**	**5.65**	**5.67**	**5.64**	**5.63**	**5.64**
8.5	**5.61**							--	--	--	--	--	--

Station (Survey Location): Station should be identified on the drawing and is measured CCW from Manway A.

R: Radius measured from Shell.

B: Difference between Shell and R Reading.

Allowable: Maximum allowable settlement from Annex B.

Type (B_e / B_{ew} / B_α): Category for Maximum Allowable Edge Settlement (ref. API 653, Para B.3.4).

In / Out / 75%: Recommendation for comparing actual to allowable readings.

☐ Yes ☐ No ☒ N/A NDT examination on welds in tanks with edge settlement greater than or equal to 75% of B_{ew} and larger than 2 inches performed.

☐ Yes ☐ No ☒ N/A Data for rigorous stress analysis collected?

Type of NDT Performed: ☐ Magnetic Particle (MT) ☐ Liquid Penetrant (PT) ☐ Alternating Current Field Measurement (ACFM)

☐ Other (describe):

HMT Inspection	HMT Job No.	26281659
API 653 Inspection Checklist	Tank No.	North Water Tank

Survey was conducted

☒ Internally CCW from Manway "A" located at Station 0.0.

☐ The survey was performed from the horizontal weld between Courses 1 and 2.

☐ Shovel Type Bottom Detail

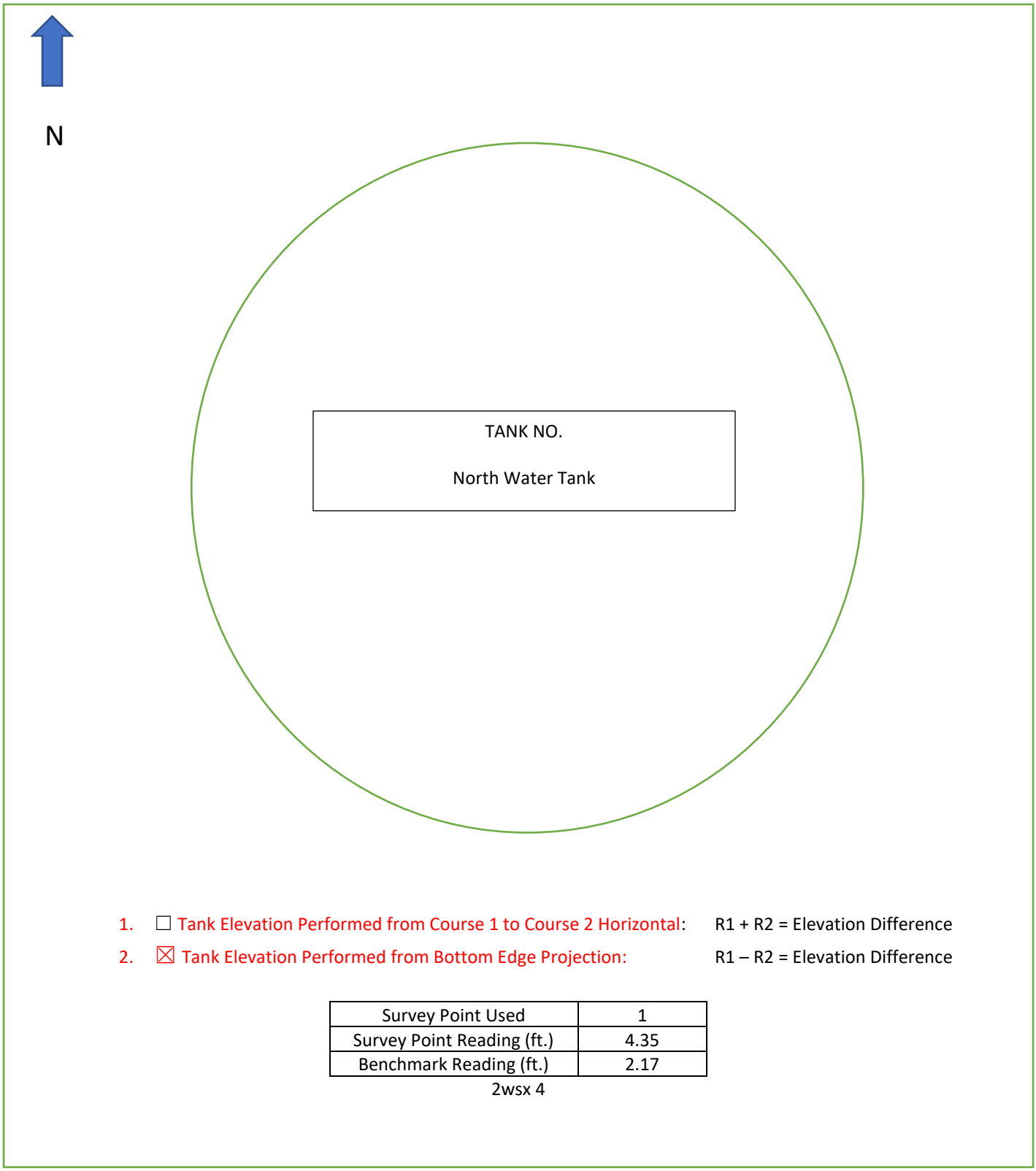
Rod readings taken in ☒ Feet ☐ Inches

Circumferential distance between readings (ft.):	**19.635**
Permanent Benchmark Reference Elevation	
Tank Height	**52.00**
Product Height	**0.00**

Station	Shell	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'	Center
1	5.65	5.57	5.58														5.43
2	5.63	5.40	5.38														5.43
3	5.50	5.35	5.34														5.43
4	5.33	5.40	5.37														5.43
5	5.23	5.40	5.36														5.43
6	5.22	5.30	5.43														5.43
7	5.31	5.58	5.58														5.43
8	5.54	5.78	5.73														5.43

Note: If a well-defined rigid tilt plane cannot be determined or the maximum out-of-plane settlement determined in accordance with B.3.2.1 is exceeded, the procedures given in this section may be used in lieu of more rigorous analysis or repair (ref. API 653, Para. B.2.2.5).

PROVIDE SKETCH OF DIKE AREA WITH BENCHMARK LOCATION IDENTIFIED:



1. ☐ Tank Elevation Performed from Course 1 to Course 2 Horizontal: R1 + R2 = Elevation Difference
2. ☒ Tank Elevation Performed from Bottom Edge Projection: R1 – R2 = Elevation Difference

Survey Point Used	1
Survey Point Reading (ft.)	4.35
Benchmark Reading (ft.)	2.17

2wsx 4

Bottom

Item No.	Acceptable	Ref 2.0	N/A	
B1	☐	☒	☐	Bottom edge projection condition (corroded or pitted, thinning, deformed, obstructed) (ref. API 653, Paras. 4.4.5.7 & 6.3.1.3). Area(s) of Bottom Edge Projection with Thickness Less than 0.100 inch? ☐ Yes (Document all locations and projection thickness measurement in Section 2.0) ☒ No (Document lowest remaining thickness based on UT collected) Area(s) of Bottom Edge Projection with Projection Less than 3/8 inch? ☐ Yes (Document all locations in Section 2.0) ☒ No (Document location and current minimum bottom edge projection)
B2	☐	☒	☐	Record minimum bottom plate thickness requirements (ref. API 653, Para. 4.4.5). **Note:** Minimum bottom plate thickness requirements for the critical zone could vary from the thickness requirements for other areas of the bottom and should be calculated according to API 653, Para. 4.4.5.4. **Note:** Minimum bottom plate thickness requirements for the annular ring should be calculated according to API 653, Para. 4.4.6.2 as applicable.
B3	☐	☒	☐	MFL scan of accessible bottom plates. Quantify all findings (ref. API 653, Paras. 4.4.4 & 4.4.5).
B4	☐	☒	☐	Visual inspection of bottom plate surface condition (ref. API 653, Para. 4.4.1).
B5	☒	☐	☐	Conduct Ultrasonic thickness readings of bottom plates. Record all data (ref. API 653, Para. 4.4.4).
B6	☒	☐	☐	Locate unacceptable voids beneath bottom. Record the locations (ref. API 653, Para. 4.4.2.h & j & API 653, Para. 9.10.2.1.3).
B7	☒	☐	☐	Visual inspection of bottom plate lap welds (for reportable indications or other anomalies) (ref. API 653, Para. 4.4.2, / Fig. 9.1).
B8	☐	☐	☒	Perform Vacuum Box testing of bottom lap welds.
B9	☒	☐	☐	Internal shell-to-bottom weld condition (ref. API 653, Para. 4.4.2).
B10	☐	☐	☒	Perform Magnetic Particle testing of internal shell-to-bottom weld.
B11	☐	☐	☒	Perform Vacuum Box testing of internal shell-to-bottom weld.
B12	☒	☐	☐	Identify all signs of product leakage.
B13	☐	☐	☒	Floating roof leg striker plate condition (pitting, cutting, and dimpling).
B14	☐	☐	☒	Fixed roof column bearing / base plate condition (corrosion, weld failure).
B15	☐	☐	☒	Fixed roof column lateral clips (align tank columns) (ref. API 650, Para. 5.10.4.7).

B2

	Soil Side	Product Side
Bottom Plate Recording Criteria	**0.165**	**0.085**
Sketch Plate Recording Criteria	**0.165**	**0.085**
Critical Zone Recording Criteria	**0.180**	**0.070**
Annular Ring Plate Recording Criteria	**N/A**	**N/A**
Nominal Bottom Plate Thickness	**0.250 inch**	
Nominal Sketch Plate Thickness	**0.250 inch**	
Nominal Annular Plate Thickness	**N/A**	
Annular Plate Width	**N/A**	

B3

Lowest Remaining Thickness	**0.200**

B5

Number of Readings per Plate	**1**

Item No.	Acceptable	Ref 2.0	N/A	
B16	☐	☐	☒	Conduct Visual inspection of reinforcing, bearing, base, striker plates and existing lap patches (ref. API 650, Paras. 5.10.4.7, H.4.6.7 & API 653, Paras. 9.10.2.2 & 9.10.3 & Fig. 9.13).

Bottom Limitations

B17	☒	☐	☐	List any limitations to the bottom inspection. **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Sump

Item No.	Acceptable	Ref 2.0	N/A	
BS1	☐	☐	☒	Describe sump type / condition. Details include physical dimensions (ref. API 653, Paras. 4.4.2, 9.10.1.5 & C.2.3 and API 650, Table 5.16b & Fig. 5.21). ☐ Dished ☐ Cylindrical w/flat bottom ☐ large (bathtub) ☐ Special (describe): Additional form used for Sump UT, VT & dimensions? ☐ Yes ☐ No ☐ N/A
BS2	☐	☐	☒	Perform Visual inspection of the sump (including all sump welds).
BS3	☐	☐	☒	Perform Magnetic Particle testing examination on all sump welds (including sump-to-bottom weld).
BS4	☐	☐	☒	Perform Sump UT. Record lowest UT reading per grid in sump UT form. **Note:** Nominal thickness, defect type and location.

Sump Limitations

BS5	☐	☐	☒	List any limitations to the sump inspection. **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Item No(s)	Additional Inspection Comments
B1	The bottom edge projection is buried under a heavy amount of vegetation from 100.50 feet through 138.20 feet counterclockwise of shell Manway A. ***This area should be re-worked to remove the vegetation away from the tank and to allow for Visual (VT) inspection of the bottom edge projection at all times (ref. API 653, Para. 6.3.1).***
B2	The tank bottom was MFL scanned to a 20 year bare steel threshold of 0.165 soilside and 0.085 product side pitting on the inner and sketch plates. The critical zone was inspected to a threshold of 0.180 soilside and 0.070 product side pitting. The MFL inspection found the lowest soilside indication to be an 0.200 inch remaining wall thickness on floor plate 4, this indication will not require repair. On floor plate 11 there were 2 product side pits that were below threshold and will require repair, the pits were 0.135 and 0.155-inches deep. ***The pits on plate 11 should be repaired by puddle welding then grounding smooth or by installing a 12"x12" lap welded patch plate over the top of the pits before returning the tank to service.***
B3	The lowest soilside indication found was 0.200 inch remaining wall thickness on floor plate. This indication does not require repair. This is noted for information only.
B4	The tank bottom has multiple areas of coating failure on the older coating and on the coating repairs that were made several years ago. Per the client a new tank bottom liner is to be installed after tank repairs are completed.

SW reference corner unless otherwise indicated. All measurements taken in inches.

***NOTE: THIS IS FOR REFERENCE ONLY AND WELD SPACING OF PATCH PLATES SHOULD BE VERIFIED BY REPAIR CONTRACTOR.**

PLATE NO. / ID	PIT DEPTH	REMAINING THICKNESS	X LOCATION	Y LOCATION	PS	SOIL SIDE	NE REF.	*Area to be Patched	COMMENTS
11 A	0.135	--	112	42	1	--	SE	12x12	or Puddle weld
11 B	0.155	--	125	10	1	--	SE	12x12	or Puddle weld
4	--	0.200	158	7	--	--	SW	No Repair	Lowest UT

SS	=	SOIL-SIDE	CZ	=	CRITICAL ZONE	WC = WELD CORROSION
PS	=	PRODUCT-SIDE	WO	=	WELD OVERLAY	TS = TOMBSTONE STYLE PATCH
LP	=	LEAK PATH	WR	=	WELD REPAIR	

PLATE NO. /	READINGS (in inches)					Station NO. /	Critical Zone UT Scrubs (in inches)				
	1						Min	Mx			
1	**0.272**					1	**0.255**	**0.260**			
2	**0.274**					2	**0.250**	**0.272**			
3	**0.256**					3	**0.250**	**0.260**			
4	**0.257**					4	**0.249**	**0.272**			
5	**0.270**					5	**0.256**	**0.270**			
6	**0.252**					6	**0.258**	**0.272**			
7	**0.240**					7	**0.251**	**0.275**			
8	**0.255**					8	**0.256**	**0.268**			
9	**0.251**										
10	**0.258**										
11	**0.257**										
12	**0.248**										
13	**0.256**										
14	**0.258**										
15	**0.264**										

BOTTOM EDGE PROJECTION READINGS

(in inches)

STATION NO.	Reading
1	0.267
2	0.270
3	0.253
4	0.249
5	0.251
6	
7	
8	0.251
Avg.:	0.257
Min.:	0.249

Bottom Edge Projection UT readings could not be recorded at stations 6 and 7 due to heavy vegetation build up.

No sump in tank

API Standard Sump Detail	YES ☐ NO ☒
Dish Style Sump Detail	YES ☐ NO ☒
Sump No. / ID. (if applicable)	
Sump Diameter (in inches):	
Sump Depth (in inches):	
Penetrating Nozzle Size:	
Penetrating Nozzle Letter:	
Bottom Plate Number:	

API STANDARD SUMP UT			
SIDE WALL (NORTH, SOUTH, EAST, WEST)			
N	**READING**	**S**	**READING**
1		1	
2		2	
3		3	
4		4	
E	**READING**	**W**	**READING**
1		1	
2		2	
3		3	
4		4	
STANDARD SUMP BOTTOM (X-PATTERN)			
North to South	**READING**	**East to West**	**READING**
1		1	
2		2	
3		3	
4		4	
5		5	

Y	N/A					
☐	☒	Additional UT of suspect areas.				
☐	☒	Additional UT per scope of work (document accordingly)				
☐	☒	Photographs taken				
☐	☒	Sump(s) included on Bottom Layout				
☐	☒	Product side corrosion present	Max. depth:		Avg. depth:	
☐	☒	Comments / Limitations:				

SIGNIFICANT BOTTOM FINDINGS

HOLES	Interior Plates	Critical Zone	Sketch Plates	Annular Ring
Number of holes located and measured.	**0**	**0**	**0**	--
Number of holes resulted from product side corrosion.	**0**	**0**	**0**	--
Number of holes resulted from soil side corrosion.	**0**	**0**	**0**	--
PRODUCT SIDE METAL LOSS				
Number of areas of PRODUCT SIDE metal loss located and measured.	**2**	**0**	**0**	--
Lowest remaining thickness.	**0.095**	**0.248**	**0.248**	--
(Estimated / Collected) Average depth of product side metal loss.	**0.145**	**0.002**	**0.002**	--
Maximum depth of product side metal loss.	**0.155**	**0.002**	**0.002**	--
Non recordable lowest remaining thickness if no corrosion found at recording criteria (information only).	--	--	--	--
SOIL SIDE METAL LOSS				
Number of areas of SOIL SIDE metal loss located and measured.	**4**	**0**	**0**	--
Lowest remaining thickness.	**0.240**	**0.248**	**0.200**	--
(Estimated / Collected) Average depth of soil side metal loss.	**0.010**	**0.002**	**0.010**	--
Maximum depth of soil side metal loss.	**0.010**	**0.002**	**0.050**	--
Non recordable lowest remaining thickness if no corrosion found at recording criteria (information only).	--	--	**0.200**	--
GENERAL CORROSION				
Average depth of general corrosion typically taken from UT readings with respect to the nominal thickness.	**0.005**	**0.002**	**0.005**	--

Tank Bottom Data:

Nominal Bottom / Interior Bottom Plate Thickness:	**0.250**
Nominal Bottom Sketch Plate Thickness:	**0.250**
Nominal Annular Ring Plate Thickness:	**N/A**
Annular Ring Plate Width:	**N/A**

Tank Bottom Data Per Client:

Minimum Allowable Bottom / Interior Bottom Plate Thickness:	**0.100**
Minimum Allowable Critical Zone Thickness:	**0.125**
Minimum Allowable Sketch Plate Thickness:	**0.100**
Minimum Allowable Annular Ring Plate Thickness:	**N/A**

HMT Inspection	HMT Job No.	26281659
API 653 Inspection Checklist	Tank No.	North Water Tank

External Shell

Item No.	Acceptable	Ref 2.0	N/A	
S1	☒	☐	☐	Shell weld / seam condition. Perform shell thickness calculations (ref. API 653, Paras. 4.3.3.1, 4.3.4, 4.3.8 & 4.3.10). ☒ Butt Welded ☐ Lap Welded ☐ Butt / Lap Riveted
S2	☐	☐	☒	Record number and pattern of rivets or bolts (ref. API 653, Table 4.3).
S3	☐	☒	☐	Check exterior shell-to-bottom weld condition (ref. API 653, Para. 6.3).
S4	☒	☐	☐	Identify all signs of product leakage (exterior) (ref. API 653, Para. 6.3).
S5	☐	☐	☒	Perform Magnetic Particle testing of exterior shell-to-bottom weld (ref. API 653, Para. 4.3.6).
S6	☐	☒	☐	Coating condition (ref. API 653, Para. 6.3). (Coating failure such as blistering, thinning, cracks, or discolored.)
S7	☒	☐	☐	Shell condition (deformations, corrosion, pitting) (ref. API 653, Para. 4.3).
S8	☐	☐	☒	Rivet condition (worn, corroded, loose rivet sealer, leaking).
S9	☒	☐	☐	Perform UT thickness readings on shell per job scope.
S10	☐	☐	☒	Inspect support welds to shell for corrosion or defects.
S11	☐	☐	☒	Wind girder / shell stiffeners condition (corrosion, weld failure) (ref. API 653, Para. 4.3.7).
S12	☐	☒	☐	Note whether supports have reinforcing pads welded to shell.
S13	☐	☐	☒	Shell-mounted vents / overflow slots present. Check for debris covering and condition of screens (ref. API 650, App. H, Para. H.5.3.3). ☐ Yes ☐ No Screens present Number of Vents Approx. Dimensions (inches) X Number of Overflow Slots Approx. Dimensions (inches) X
S14	☐	☐	☒	Conduct Visual inspection of shell insulation. Inspect for damage (ref. API 653, Para. 6.3.2.2).

Internal Shell

S15	☐	☒	☐	Visual inspection of the internal shell surface for corrosion and pitting (ref. API 653, Para. 4.3).
S16	☒	☐	☐	Visual inspection of interior shell welds / seams (ref. API 653, Para. 4.3.8).
S17	☐	☐	☒	Visual inspection of rivets (check for corrosion pitting, or looseness and riveted seams leaks).
S18	☒	☐	☐	Inspect support welds to shell for corrosion or defects.
S19	☐	☒	☐	Note whether supports have reinforcing pads weld to shell.

External & Internal Shell

S20	☒	☐	☐	List any limitations to the shell inspection. **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Item No(s)	Additional Inspection Comments
S3	The shell-to-bottom joint is covered with heavy vegetation, ice and snow. ***This area should be re-worked to remove the vegetation away from the tank and to allow for Visual (VT) inspection of the shell-to-bottom joint at all times (ref. API 653, Para. 6.3.1).***
S6	The coating is in like new condition, there a was one location of minor coating damage in course 1 at 131.45 feet through 134.75 feet counter-clockwise of Manway A. ***The area of damage appears to mechanical from possible contact with a piece of machinery. The primer coat is visible in the area of damage. Consideration should be given to properly cleaning and recoating the area before any further coating failure happens.***
S12	The shell support braces for Overflow Nozzle C and Vertical Ladder E lack pad plates between the external shell and the support braces. ***Consideration should be given to installing pad plates on the external shell during the next major repairs.***
S15	The internal shell had 2 pits roughly quarter size just above the internal cornerweld. The first was 0.110 inches deep and was located 12.50 feet counter-clockwise of shell Manway A. The second pit was 0.100 inches deep and was located at 32.42 feet counter-clockwise of shell Manway A. ***The pits should be puddle welded and ground smooth before the new internal shell tank liner is installed.***
S15	The internal shell liner is in fair condition with scattered areas of coating failure chipping, cracking, and blistering. Per the client a new internal shell liner is to be installed after tank repairs are made. This is noted for information only.
S19	The shell supports for the 14-inch nozzle coming out of floor plate 14 lack pad plates on the internal shell. ***Reinforcing pad plates should be installed between the shell supports and and internal shell while the tank is out of service for repairs.***

Shell Thickness Calculations

The minimum acceptable shell plate thickness for tanks with a diameter equal to or less than 200 feet is calculated as follows (ref. API 653, Para. 4.3.3.1):

$$t_{min} = \frac{2.6\,D(H-1)\,G}{S\,E}$$

Where:
- *H* = Product Height (ft.)
- *D* = Nominal Diameter of Tank (ft.)
- *S* = Allowable Stress (psi) – **See below**

21,000	Riveted tanks
23,600	Courses 1 and 2 for Welded tanks
26,000	Upper Courses for Welded tanks

- *G* = Specific Gravity of Contents
- *E* = Joint Efficiency – **See Tables**

Table 4-2 – Joint Efficiencies for Welded Joints

Standard	Edition & Year	Type of Joint	Joint Efficiency E	Applicability or Limits
API 650	7th & Later (1980-Present)	Butt	1.00	Basic Standard
		Butt	0.85	Appendix A – Spot RT
		Butt	0.70	Appendix A – No RT
	1st – 6th (1961-1978)	Butt	0.85	Basic Standard
		Butt	1.00	Appendices D & G
API 12C	14th & 15th (1957-1958)	Butt	0.85	
	3rd – 13th	Lap[a]	0.75	3/8 inch max *t*
	(1940-1956)	Butt[c]	0.85	
	1st & 2nd (1936-1939)	Lap[a]	0.70	7/16 inch max *t*
		Lap[b]	0.50 + k/5	1/4 inch max *t*
		Butt[c]	0.85	
Unknown		Lap[a]	0.70	7/16 inch max *t*
		Lap[b]	0.50 + k/5	1/4 inch max *t*
		Butt[c]	0.70	
		Lap[d]	0.35	

[a] Full double lap weld.

[b] Full fillet weld with at least 25 percent intermittent full fillet opposite side; k = percent of intermittent weld expressed in decimal form.

[c] Single butt welded joints with a back-up bar were permitted from the years of 1936 to 1940 and 1948 to 1954.

[d] Single lap weld only.

Table 4 -3 – Joint Efficiencies for Riveted Joints

Type of Joint	Number of Rivet Rows	Joint Efficiency E
Lap	1	0.45
Lap	2	0.60
Lap	3	0.70
Lap	4	0.75
Butt[a]	2[b]	0.75
Butt	3[b]	0.85
Butt	4[b]	0.90
Butt	5[b]	0.91
Butt	6[b]	0.92

[a] All butt joints listed have butt straps both inside and outside.

[b] Number of rows on each side of joint centerline.

COMPLETE TABLE ON NEXT PAGE

Course	Course Height (in.)	Material of Construction	Allowable Stress (psi)	No. of Rivet Rows (Butt or Lap)	Joint Efficiency	Average Thickness (in.)	Required Thickness (in.)
1	96	CS (Grade Not Known)	23,600		0.70	0.559	0.401
2	96	CS (Grade Not Known)	23,600		0.70	0.511	0.338
3	96	CS (Grade Not Known)	26,000		0.70	0.361	0.250
4	84	CS (Grade Not Known)	26,000		0.70	0.319	0.193
5	84	CS (Grade Not Known)	26,000		0.70	0.250	0.143
6	84	CS (Grade Not Known)	26,000		0.70	0.253	0.100
7	84	CS (Grade Not Known)	26,000		0.70	0.250	0.100
Top Angle			N/A	N/A	N/A		N/A

☐ Yes ☒ No Variable Point Method used?

☐ Yes ☒ No Elevated Temp. Tank (ref. API 650, Appendix M & API 653, Para. 4.3.10)

☐ Yes ☒ No Change of Service (ref. API 653, Para. 4.2.4 as applicable)

Shell Corrosion Rate Calculations

When the corrosion rate is not known, the maximum interval shall be 5 years (ref. API 653, Para. 6.3.3.2 a). When the corrosion rate is known, the maximum interval shall be the smaller of RCA / 2N years or fifteen (15) years (ref. API 653, Para. 6.3.3.2 b):

$$RCA = t_{act} - t_{min}$$

$$N = \frac{t_{prev} - t_{act}}{Y}$$

$$I_{UT} = \frac{t_{act} - t_{min}}{2N}$$

Where:

RCA =	See Table	=	Difference between the measured shell thickness and the minimum required thickness in inches.
N =	See Table	=	Shell corrosion rate in inches per year
Y =	**Years in service**	=	
I_{UT}	See Table	=	Inspection interval for the next Ultrasonic (UT) testing, in years (not to exceed 15 years)

Course No.	Previous Measured Average Thickness (in.) (t_{prev})	Current Measured Average Thickness (in.) (t_{act})	Material Loss (in.)	Minimum Required Thickness (in.) (t_{min})	RCA (in.)	Corrosion Rate (in./yr.) (N)	Next Ultrasonic (UT) Thickness Inspection (years) (I_{UT})
1	0.563	0.559	0.004	0.401	0.158	0.000	15
2	0.500	0.511	0.000	0.338	0.173	0.000	15
3	0.375	0.361	0.014	0.250	0.111	0.001	15
4	0.312	0.319	0.000	0.193	0.126	0.000	15
5	0.250	0.250	0.000	0.143	0.107	0.000	15
6	0.250	0.253	0.000	0.100	0.153	0.000	15
7	0.250	0.250	0.000	0.100	0.150	0.000	15

☒ Yes ☐ No Original (Nominal) Shell UT Available for RCA Calculations?

☐ Yes ☒ No Previous Shell UT Available for RCA Calculations?

If previous readings were provided from a past inspection report, what year were the previous readings taken? **No Data Available**

NOTE: Original data will establish a Long-Term Corrosion Rate (LTCR) while previous inspection data will provide a Short-Term Corrosion Rate (STCR).

NOTE: Without established Condition Monitoring Location (CML) points, data collection locations may vary between inspections.

☐ Yes ☒ No UT Inspection stickers were placed on tank by HMT?

☐ Yes ☒ No Existing Inspection stickers / CMLs were present?

☐ Yes ☒ No Copies made of the past UT data for the HMT file?

External Inspection Interval Calculations

The external inspection interval shall be the lesser of 5 years or RCA / 4N (API 653, Para. 6.3.2.1):

$$RCA = t_{act} - t_{min}$$

$$N = \frac{t_{prev} - t_{act}}{Y}$$

$$I_{VT} = \frac{t_{act} - t_{min}}{4N}$$

Where:

RCA =	See Table	=	Difference between the measured shell thickness and the minimum required thickness in inches.
N =	See Table	=	Shell corrosion rate in inches per year
Y =	**Years in service**	=	
I_{VT}	See Table	=	Inspection interval for the next Visual Inspection in years (not to exceed 5 years)

Course No.	Previous Measured Average Thickness (in.) (t_{prev})	Current Measured Average Thickness (in.) (t_{act})	Material Loss (in.)	Minimum Required Thickness (in.) (t_{min})	RCA (in.)	Corrosion Rate (in./yr.) (N)	Next External Visual Inspection (years) (Ivt)
1	0.563	0.559	0.004	0.401	0.158	0.000	5
2	0.500	0.511	0.000	0.338	0.173	0.000	5
3	0.375	0.361	0.014	0.250	0.111	0.001	5
4	0.312	0.319	0.000	0.193	0.126	0.000	5
5	0.250	0.250	0.000	0.143	0.107	0.000	5
6	0.250	0.253	0.000	0.100	0.153	0.000	5
7	0.250	0.250	0.000	0.100	0.150	0.000	5

Item No(s)	Additional Inspection Comments

ULTRASONIC (UT) SHELL DROPS		OWNER/CLIENT		Johnstown Mun. / Tanco Eng.			HMT JOB NO.		26281659
		LOCATION		Johnstown, CO			DATE		2/14/2023
Drop No.:				**(ALL MEASUREMENTS ARE IN INCHES)**					
READING	**COURSE 1**	**COURSE 2**	**COURSE 3**	**COURSE 4**	**COURSE 5**	**COURSE 6**	**COURSE 7**		
1	0.557	0.513	0.362	0.319	0.251	0.254	0.252		
2	0.560	0.512	0.361	0.319	0.250	0.253	0.250		
3	0.563	0.509	0.361	0.318	0.249	0.253	0.248		
Drop Avg.	0.560	0.511	0.361	0.319	0.250	0.253	0.250		
1	0.561								
2	0.560								
3	0.558								
Drop Avg.	0.560								
1	0.558								
2	0.561								
3	0.562								
Drop Avg.	0560								
1	0.555								
2	0.556								
3	0.554								
Drop Avg.	0.555								

External Nozzles and Appurtenances

Item No.	Acceptable	Ref 2.0	N/A	
N1	☒	☐	☐	Document nozzle / manway information on the Nozzle and Appurtenance Table (ref. API 653, Para. 4.3.9).
N2	☐	☒	☐	Evaluate nozzle(s) / manway(s) acceptability to current API 650 / 653 guidelines. Weld spacing, centerline, reinforcement size, nozzle neck thickness (inspect shell nozzles for thinning, pitting and coating failure) and telltale holes, etc. (ref. API 650, Paras. 5.7, 5.7.5.1 and 5.7.2.10 & API 650, Table 5.6B & Fig. 5.8).
N3	☐	☒	☐	Visual inspection of all external welds (ref. API 653, Para. 4.3.9.1).
N4	☒	☐	☐	Indications of leakage around manways, nozzles, flanges and appurtenances (including reinforcement, bolting, gaskets and seals).
N5	☒	☐	☐	Check piping and valves for leaks, thermal relief, or signs of damage (ref. API 653, Para. C.1.3.2).
N6	☐	☐	☒	Inspect mixer(s) for support, leakage and defects (ref. API 653, Para. C.1.3.6).
N7	☐	☐	☒	Roof drain leakage
N8	☐	☐	☒	Temperature indicators / probes (corrosion, mechanical damage).
N9	☒	☐	☐	Automatic gauge condition (corrosion, mechanical damage) (ref. API 653, Para. C.1.3.3 & API 653, Para. 6.9.3b). Mfg.: **Mercoid** S/N: **N/A** Model: **SBLT2-25-60** Type (See Below): ☐ Tape & Float ☐ Radar ☐ Target Board Indicator ☒ Other (describe): ***Submersible Level Transducer***
N10	☐	☐	☒	Check welds on shell-mounted davit clips above large valves or equipment (ref. API 650, Para. 5.8.3.5 & API 653, Para. C.1.3.2h).
N11	☒	☐	☐	Welds on stairways / ladders, gauge platform / ladder, landing platform stringers (corrosion, broken, coating failure) (ref. API 650, Para. 5.8.1.2.a & API 653, Para. C.2.12.4).
N12	☐	☒	☐	Verify requirements for Platforms, Walkways & Stairways (ref. API 650, Table 5.17 & Table 5.18). **Note: Retrofit of existing tanks is not required.**

Item No(s)	Additional Inspection Comments
N2	Nozzle B has a reinforcing plate without a telltale hole. ***API 650, Paras. 5.7.5.1 and 5.7.2.10 indicate reinforcing plates should be installed with telltale holes. A Telltale holes should be drilled and the reinforcing plate air tested to API standards. The telltale holes should then be left open to the atmosphere.***
N2	Nozzles A and B have a weld spacing between their reinforcing plates and the shell-to-bottom joint less than that required by API 650, Para. 5.7.3. Such practices results in areas of increased stress concentration and possible accelerated corrosion. Visual (VT) inspection of these nozzles did not identify any such corrosion at this time. ***These reinforcing plates and the adjacent shell-to-bottom weld should be inspected utilizing Magnetic Particle (MT) testing (ref. API 653, Para. 4.3.9.1) prior to returning the tank to service. Consideration should be given to modifying these penetration details in accordance with API 650 guidelines the next time this tank has major repairs to the shell or when hydrostatic testing is required for other reasons.***
N2	Shell Coupling D is a 4 inch shell penetration that does not have a reinforcing plate as suggested by API 650, Para. 5.7.2.1 that states “Openings in tank shells larger than required to accommodate a NPS 2 flanged or threaded nozzle shall be reinforced”. ***Reinforcing plates can be added around this penetration details the next time this tank has major repairs to the shell or calculations performed to verify that these openings are adequately reinforced as installed.***
N2	Shell Coupling D has a weld spacing between the neck weld and the shell-to-bottom joint less than that required by API 650, Para. 5.7.3. Such practices results in areas of increased stress concentration and possible accelerated corrosion. Visual (VT) inspection of these nozzles did not identify any such corrosion at this time. ***These reinforcing plates and the adjacent shell-to-bottom weld should be inspected utilizing Magnetic Particle (MT) testing (ref. API 653, Para. 4.3.9.1) prior to returning the tank to***

	service. Consideration should be given to modifying these penetration details in accordance with API 650 guidelines the next time this tank has major repairs to the shell or when hydrostatic testing is required for other reasons.
N3	On the underside of the shell to neck weld of Coupling D there is a moderate size area of poor weld quality, coating failure and corrosion present. ***The area should be properly cleaned, rewelded, and recoate before plcing the tank back into service.***
N3	Shell Overflow Nozzle C has a galvanized shell support brace in course 1 that is only welded to the overflow pipe and not the shell. ***The brace should be properly welded to the external shell with a pad plate between the support brace and the external shell before placing the tank back into service.***
N12	Vertical Ladder E is roughly a 45 foot tall ladder that does not have a safety cage around it and does not have a mid-platform for OHSA requirements. ***While the tank is out of service consideration should be given to installing a proper caged vertical ladder and mid-platform before returning the tank to service.***

Internal Nozzles and Appurtenances

Item No.	Acceptable	Ref 2.0	N/A	
N13	☒	☐	☐	Shell nozzle and Internal piping condition.
N14	☒	☐	☐	Hot tap nozzles (sealed internally) (ref. API 653, Para. 9.14 & Table 9.1 & API 653, Para. 12.1.2.1b).
N15	☐	☐	☒	Check for possible causes of damage to the seal (i.e. nozzle interference).
N16	☒	☐	☐	Visual inspection of all welds (ref. API 653, Para. 4.3.9.1) (weld defects and location).
N17	☐	☐	☒	Check automatic gauge condition.

Internal Appurtenances / Floating Suction Line

N18	☐	☐	☒	Visual inspection of internal piping and connection condition (corrosion, cracking).
N19	☐	☐	☒	Visual inspection of piping supports and pads (structurally adequate, weld failure).
N20	☐	☐	☒	Determine condition / length of swing line / limit chain (ref. API 653, Para. C. 2.11.6). Length: _____ Pontoon Diameter: _____ Pontoon Length: _____

Internal Appurtenances / Floating Roof Drain

N21	☐	☐	☒	Type and condition (cutting or dragging on tank bottom) (ref. API 650, Para. 4.2.3.3 & API 653, C. 2.10).
N22	☐	☐	☒	Internal piping and connection condition (corrosion, cracking).
N23	☐	☐	☒	Check for obstructions that pipe could catch on (ref. API 650, Para. 5.8).
N24	☐	☐	☒	Swing line hold-down cable (damaged or loose).
N25	☐	☐	☒	Swing line safety hold-down chains (corrosion, weak links).

External & Internal Nozzle Limitations

N26	☒	☐	☐	List any limitations to nozzle & appurtenance inspection. **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Item No(s)	Additional Inspection Comments

					Reinforcing Plate											
Item	Description	Pipe Size (in.)	Station (ft.)	CL Elev. (in.)	Width (in.)	Height (in.)	Thick (in.)	Shape	1 or 2 Piece	Neck Thick (in.)	Flng Thick (in.)	Shell-to-Flng Face (in).	Cover Thick (in.)	Tell-tale	Weld Space (in.)	Comments
A	Manway	24	0.00	30	64	53	0.252	A	1	0.320	0.626	6.5	0.763	Y-1	2	
B	Nozzle	16	54.60	25	42	42	0.512	B	1	0.343	1.544	17	--	No	2	
C	Nozzle	8	148.65	Ring 7	--	--	--	--	--	0.317	--	--	--	--	--	Overflow
D	Coupling	4	151.00	3	--	--	--	--	--	--	--	--	--	--	0.25	
E	Vertical Ladder	--	153.70	--	--	--	--	--	--	--	--	--	--	--	--	

Assign a letter (M-Z) to odd-shaped reinforcing plates, TAKE A PHOTO and sketch a representation on back.

Shape

Total Strapped Circumference = **157.38**	Stairway: CW ☐ CCW ☐ OTHER ☒ (Describe): **Vertical Ladder**
(Include stairway bottom & top locations in above table)	

Vertical Rivet Seam / Weld locations

The stations are measured circumferentially counterclockwise from Manway A ☒ Other (Describe Below) ☐

COURSE 1 VERTICAL RIVET SEAM / WELD LOCATIONS:

1)	6.72	2)	32.95	3)	59.18	4)	85.41	5)	111.63	6)	137.86						

COURSE 2 VERTICALRIVET SEAM / WELD LOCATIONS:

1)	19.85	2)	46.10	3)	72.30	4)	98.55	5)	124.80	6)	151.00						

VERTICAL RIVET SEAM / WELD OFFSET FOR COURSES 3, 4, 5, etc.

3)	6.72	4)	19.85	5)	6.72	6)	19.85	7)	6.72						

Supplemental Nozzle UT

Nozzle ID	Clock Position				
Item	12	3	6	9	Average
A	0.320	0.320	0.321	0.320	0.320
B	0.345	0.345	0.345	0.343	0.345
C	0.322	0.317	0.319	0.319	0.319

Fixed Roof

Does the tank have a fixed roof? **Yes** ☒ **No** ☐ If no, the entire fixed roof section is N/A.

Item No.	Acceptable	Ref 2.0	N/A						
FR1	☒	☐	☐	Roof plate condition (corrosion, pitting, coating failure, standing water / low areas). Locate on layout (ref. API 653, Paras. 4.2.1.1 & 4.2.1.2).					
FR2	☐	☒	☐	Perform UT thickness readings on roof per work scope.					
FR3	☒	☐	☐	Conduct Visual inspection of roof-to-shell joint (ref. API 653, Para. 4.2.2).					
FR4	☐	☐	☒	Conduct Visual inspection of roof insulation. Inspect for damage (ref. API 653, Paras. 6.3.1 & 6.3.2.2).					
FR5	☒	☐	☐	Manway / nozzle / appurtenance condition (ref. API 653, Para. 4.2.4.5 & API 650, Para. H.5.2.2).					
FR6	☒	☐	☐	Identify pressure / vacuum vents or vents (quantity and sizes) (ref. API 653, Para. 4.2.4.5 / API 650, Para. H.5.2.2 / API 650, Para. 5.8.5).					
				Type:	**Center Circulation Vent**	Quantity:	1	Size:	
				Type:		Quantity:		Size:	
FR7	☐	☐	☒	Inspect pressure / vacuum vent pallet assembly seals and screens (weathering) (ref. API 653, Para. 4.2.4.5 & API 650, Para.H.5.2.2).					
FR8	☐	☐	☒	Gauge hatch (clean, operates freely and seals properly).					
FR9	☐	☐	☒	Scaffold cable support is present and is in good condition (ref. API 650, Para. 5.8.8 and Figure 5.22).					
FR10	☐	☐	☒	Visual inspection of high-level and high-high-level alarms for damage (ref. API 653, C.2.10.10).					

Aluminum Dome Roof

FR11	☐	☐	☒	Check perimeter flashing for damage.
FR12	☐	☐	☒	Evidence of leaking panels (presence of water on internal floating roof).
FR13	☐	☐	☒	Deterioration of skylights (crazing caused by UV light, cracking) (ref. API 650, Para. G.2.6).
FR14	☐	☐	☒	Panel caulking and seals (entire roof) (ref. API 650, Para. G.2.5.1).
FR15	☐	☐	☒	Rain gutters (damaged or broken).
FR16	☐	☐	☒	Dome overhang screens in place and in good condition.
FR17	☐	☐	☒	Check dome roof support details for signs of damage or malfunction.
FR18	☐	☐	☒	Check roof for pinholes, tears, or other damage to the aluminum sheeting.

Item No(s)	Additional Inspection Comments
FR2	The inspection of the dome roof was performed from the manlift basket limiting the roof visual inspection and UT inspection. The UT readings were recorded on plates that were accessible by manlift. The UT readings ranged from 0.215 to 0.222 inches. This is noted for information only.

Item No.	Acceptable	Ref 2.0	N/A	
FR19	☐	☐	☒	Type of column, size and number (pipe, structural) (ref. API 653, Paras. 4.2.2.1 & 4.4.2i).

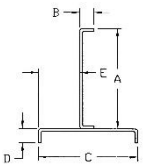
Type of Supports: ☐ Pipe Column ☐ Channel Column ☐ Other

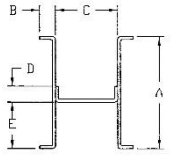
Number of Supports:

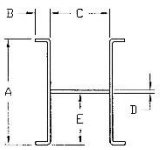
Number of rafters (working from center)

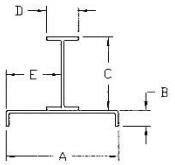
Bay 1		Bay 4	
Bay 2		Bay 5	
Bay 3		Bay 6	

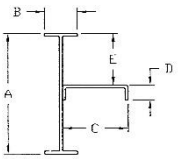
Mark the Fixed Roof Column Type (draw the Fixed Roof Column Type if different from examples)

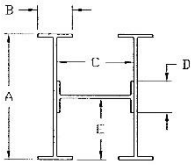
☐ A 

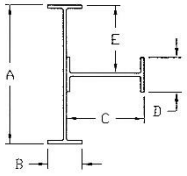
☐ B 

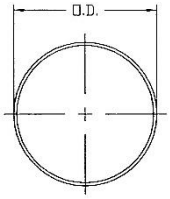
☐ C 

☐ D 

☐ E 

☐ F 

☐ G 

☐ H 

☐ Other

Fixed Roof Column Measurements

A		D	
B		E	
C			

H Type Only:

Pipe Diameter		Thickness	

Center Column Reinforcement: ☐ Yes ☐ No

Base Plate		Thickness	
Bearing Plate		Thickness	

Other Column Reinforcement: ☐ Yes ☐ No

Base Plate		Thickness	
Bearing Plate		Thickness	

FR20	☐	☐	☒	Check columns for plumbness, bending or distortion (ref. API 653, Paras. 4.2.2.1 & 10.5.2.1).
FR21	☐	☐	☒	Condition of structural columns (check for corrosion, scale, breaking of tack welds) (ref. API 653, Para. 4.2.2.1 & API 650, Para. 5.10.3.2).
FR22	☐	☐	☐	Check rafter condition (ref. API 653, Para. 4.2.2.1).
FR23	☐	☐	☒	Check girder condition (ref. API 653, Para. 4.2.2.1).
FR24	☐	☐	☒	Visual inspection of all rafter clips (ref. API 653, Para. 4.2.2.1).
FR25	☐	☒	☐	Visual inspection of internal roof plates for holes, scale build-up and pitting.
FR26	☒	☐	☐	**List any limitations to <u>Fixed Roof</u> inspection.** **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Item No(s)	Additional Inspection Comments

FR19-FR24	The tank has a self supported lap welded dome roof with no internal support columns. This is noted for information only.
FR25	The internal coating of the fixed roof has scattered areas of coating failure that were visible from standing on the tank floor. Scale build up was present along the lap seams. ***Consideration should be given to properly cleaning and recoating the areas of concern especially those with corrosion present.***

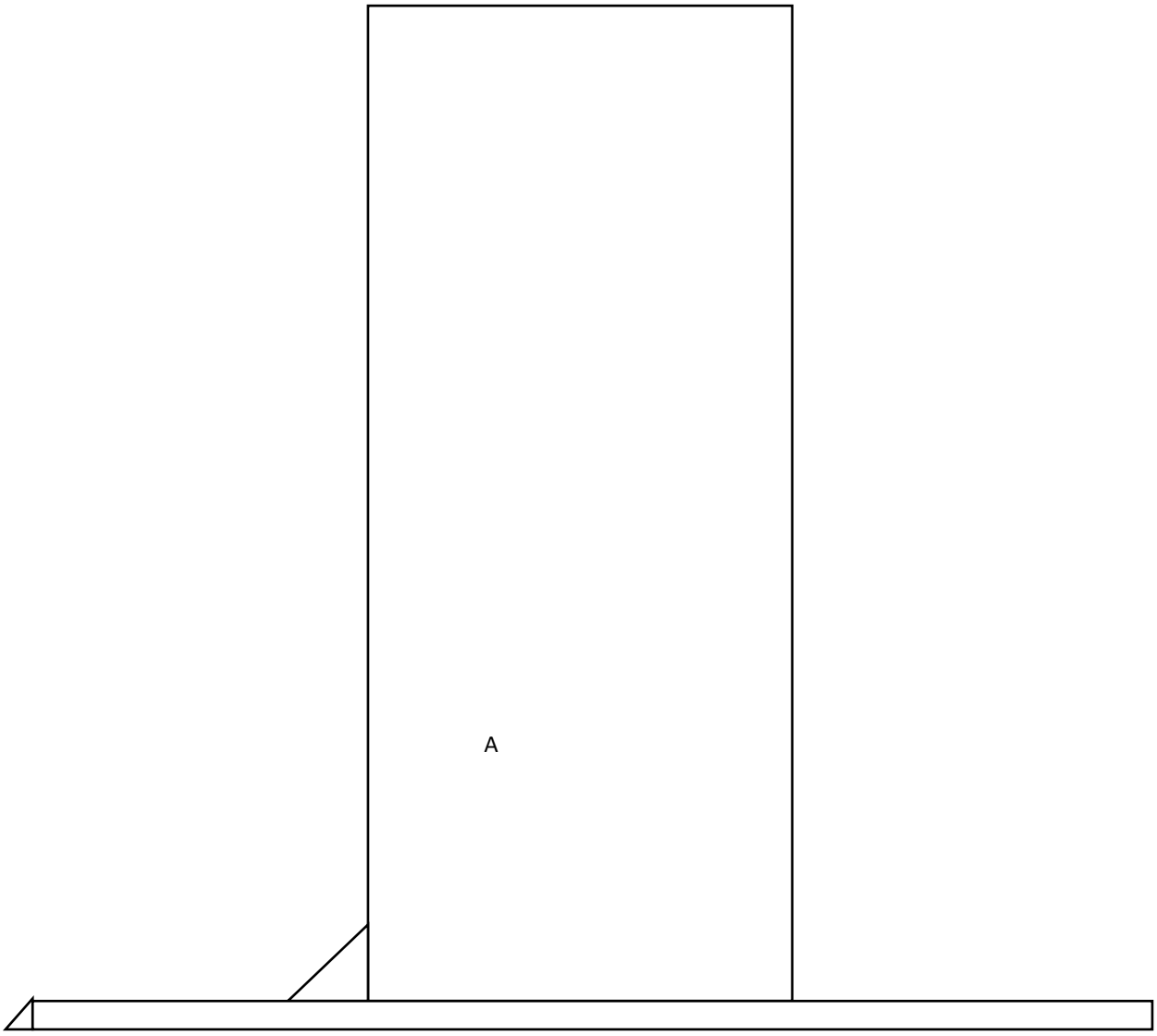
Fixed Roof Nozzle Table

Item	Description	Pipe Size (in.)	Location Plate No.	Neck Thickness (in.)	Comments
A	Nozzle		1		Center Open Vent
B	Coupling		13		
C	Manway		13		

FIXED ROOF

PLATE NO. / ID	READINGS (in inches)											
	1	2	3									
1	.	.	.									
2	**0.218**	**0.218**	**0.218**									
3	**0.217**	**0.216**	**0.219**									
4	.	.	.									
5	.	.	.									
6	.	.	.									
7	.	.	.									
8	.	.	.									
9	.	.	.									
10	.	.	.									
11	.	.	.									
12	.	.	.									
13	.	.	.									
14	**0.218**	**0.219**	**0.218**									
15	**0.219**	**0.219**	**0.218**									
16	**0.218**	**0.220**	**0.219**									
17	**0.220**	**0.222**	**0.219**									
18	**0.218**	**0.217**	**0.215**									
19	**0.218**	**0.217**	**0.217**									
20	**0.219**	**0.221**	**0.219**									
21	**0.218**	**0.219**	**0.219**									

The Inspection of the Dome Roof and UT readings were performed from the manlift limiting the inspection.



B

C →

A- Size of Pipe - **** Use correct** D **NPS OD and ID for Excel Calculation**

Thickness - Height -

B- Weld Size - ← **Use the SMALLER of the two welds for the Excel Calculation**

C- Weld Size - ← **Use the SMALLER of the two welds for the Excel Calculation**

D- Repad Size / Diameter -

Thickness -

No access to inspect the center vent for a scaffold tie off point.

Floating Roof

Does the tank have a floating roof? **Yes** ☐ **No** ☒ If no, the entire floating roof section is N/A.

Floating Roof Primary Mechanical Shoe Seal

Item No.	Acceptable	Ref 2.0	N/A	
FLR1	☐	☐	☒	Inspect seal condition, hangers, shoes (system vapor barrier, and attachment hardware) (ref. API 653, Paras. 4.2.3.3 & 6.2.3).

Floating Roof Primary Foam Log Seal

FLR2	☐	☐	☒	Inspect seal fabric, foam, hardware (ref. API 653, Para. 4.2.3.3).

Floating Roof Primary Seal (Other)

FLR3	☐	☐	☒	Type of primary seal (ref. API 653, Para. 4.2.3.3).	
FLR4	☐	☐	☒	Check for mechanical damage and corrosion (wear on tip from contact with shell) (ref. API 653, Para. 4.2.3.3).	
FLR5	☐	☐	☒	Measure seal gaps at regular intervals and record any visible seal damage (ref. API 653, Para. 4.2.3.3).	
FLR6	☐	☐	☒	Conduct Visual inspection of bolts and fasteners, with special attention to product interface areas (ref. API 653, Para. 4.2.3.3).	

Floating Roof Secondary Seal

FLR7	☐	☐	☒	Type of rim-mounted secondary seal (ref. API 653, Para. 4.2.3.3).	
FLR8	☐	☐	☒	Check for mechanical damage and corrosion (wear on tip from contact with shell) (ref. API 653, Para. 4.2.3.3).	
FLR9	☐	☐	☒	Measure seal gaps at regular intervals and record any visible seal damage (ref. API 653, Para. 4.2.3.3).	
FLR1O	☐	☐	☒	Conduct Visual inspection of bolts and fasteners, with special attention to product interface areas (ref. API 653, Para. 4.2.3.3).	

Floating Roof Legs

FLR11	☐	☐	☒	Floating roof support legs. Record sizes and locate on layout. Count floating roof legs and match number on Layout(s) (ref. API 653, Paras. 4.2.3 & 9.10.2.1.5).		
				Number of Legs		☐ Adjustable ☐ Fixed
				High Leg Setting		Leg Size
				Low Leg Setting		Sleeve Size
FLR12	☐	☐	☒	Visual inspection of floating roof legs (bending, thinning or buckling) (ref. API 653, Para. 4.2.3 & API 650, Paras. C.3.3.3, C.3.10 & H.6.4).		
FLR13	☐	☐	☒	Condition of roof leg sleeves (cracking, thinning, buckling and presence of drain notch) (ref. API 653, Para. 4.2.3 & API 650, Paras. C.3.3.3 & C.3.10).		
FLR14	☐	☐	☒	Condition of roof leg reinforcing pads (cracking, buckling & inspect gussets) (ref. API 653, Para. 4.2.3).		
FLR15	☐	☐	☒	Roof leg pins (corrosion, sticking, missing) (ref. API 653, Para. 4.2.3).		
FLR16	☐	☐	☒	All roof legs at the same level (floating roof level) (ref. API 653, Paras. 4.2.3 & 9.10.2.1.5).		

Floating Roof Appurtenances

FLR17	☐	☐	☒	Binding of roof columns or supports (ref. API 653, Para. 4.2.3).
FLR18	☐	☐	☒	Damage to ladder or column wells and covers (ref. API 653, Para. 4.2.3).
FLR19	☐	☐	☒	Bonding static cable attached and in good condition (ref. API 653, Paras. 4.2.3 & 6.3.2.3 & API 650, Para. H.4.1.6).

Item No.	Acceptable	Ref 2.0	N/A		
FLR20	☐	☐	☒	Roof drain sump condition (clean and free of debris) (ref. API 653, Para. 4.2.3 & API 650 Para. H.4.1.6).	
FLR21	☐	☐	☒	Inspect rolling ladder or vertical ladder assembly (ref. API 653, Paras. 4.2.3 & 4.2.3.3 & API 650 Paras. C.3.7 & H.5.1).	
FLR22	☐	☐	☒	Identify type, number and condition of anti-rotation details (ref. API 653, Para. 4.2.3 & API 650, Para. H.5.4).	
				Type:	Quantity:
FLR23	☐	☐	☒	Inspect & report gauge pole diameter and type (ref. API 653, Para. 4.2.3 & API 650 Paras. C.3.3.6, C.3.14 & H.5.7). ☐ Slotted ☐ Solid	Gauge Pole Diameter:
FLR24	☐	☐	☒	Inspect manway and appurtenances (ref. API 653, Para. 4.2.3 & API 650, Paras. C.3.3.6, C.3.11 & H.5.5).	
FLR25	☐	☐	☒	Inspect Vacuum Breaker, rim vent, gauge hatch, gasket, etc. Record size and location on layout (ref. API 653, Para. 4.2.3 & API 650, Paras. C.3.3.6, C.3.9, C.3.15.3 & H.5.2.1).	

Floating Roof - General

FLR26	☐	☐	☒	Levelness / condition of floating deck (ref. API 653, Paras. 4.2.3 & 9.10.2.1.5).
FLR27	☐	☐	☒	Signs of product on the floating roof (may indicate loss of flotation) (ref. API 653, Para. 4.2.3).

External Floating Roof

FLR28	☐	☐	☒	Condition of roof plates / welds (corrosion, coating failure, leaks, and debris on roof) (ref. API 653, Para. 4.2.3).
FLR29	☐	☐	☒	Inspect pontoons for water, product, residue and vapors. Check for presence of lock-down attachments on pontoon covers (ref. API 653, Paras. 4.2.3 & 9.12.3 & C.1.5.13 & API 650, Para. C.3.5).

Aluminum Pontoon Floating Roof

FLR30	☐	☐	☒	Check floating roof condition (rips, tears, buckled member, condition of hardware, broken or missing parts, product in panels) (ref. API 653, Para. 4.2.3).
FLR31	☐	☐	☒	If the floating roof has deck drains, check that all drains have working closures and bottom side tubes are below the product level.
FLR32	☐	☐	☒	Inspect aluminum pontoons for product inside.

Aluminum Full-Contact Floating Roof

FLR33	☐	☐	☒	Check floating roof condition (rips, tears, buckled members, condition of hardware, broken or missing parts, product in panels) (ref. API 653, Para. 4.2.3).
FLR34	☐	☐	☒	Check manway latches for workability and ensure that all opening manways are self-closing (should not be open while in-service).

Internal Steel Floating Roof

FLR35	☐	☐	☒	Visual inspection for signs of corrosion or pitting on top and product side surfaces (ref. API 653, Para. 4.2.3).
FLR36	☐	☐	☒	Visual inspection of all welds (ref. API 653, Para. 4.2.3).

Floating Roof Limitations

FLR37	☐	☐	☒	List any limitations to the floating roof inspection. **Note:** Client must be informed of any limitations to inspection while at the job site. All limitations must be properly documented and addressed accordingly in the Preliminary Report.

Y	N/A	Bottom Plate Examination - The bottom plates were examined utilizing the following inspection methods:					
☐	☒	HMT I1 MFL Bottom Scanner		Serial No.:			
☒	☐	MFE Enterprises 2412		Serial No.: 0020			
☐	☒	3D MFL Mapping Scanner		Serial No.:			
☐	☒	HMT Mini-I1 Scanner		Serial No.:			
☐	☒	RTD Mini-scanner		Serial No.:			
☐	☐	Other		Serial No.:			
DOCUMENT AS APPLICABLE ➔		**Gain:**		**Threshold:**			

Y	N/A						
☒	☐	Overall scanning condition of bottom plates:					
☒	☐	Ultrasonic (UT) testing of MFL indications					
☒	☐	Random Ultrasonic (UT) thickness point readings of bottom plates			Thickness readings per Plate:	**1**	
☐	☒	100% UT of Critical Zone (CZ)					
☒	☐	UT scrubs in Critical Zone (CZ)	Spacing between UT scrubs (in feet):	**19.6**	Quantity of UT scrubs:	**8**	
☐	☒	Random UT scrubs throughout Bottom	Quantity of UT scrubs:				
		☒ UT Scrub Size: **12-inch x 6-inch**	☐ Other (Specify size):				
☒	☐	UT scrub locations documented on Bottom Layout with **Minimum & Average** for each location					
☒	☐	UT around & between existing patch plates					
☒	☐	Ultrasonic (UT) testing of Bottom Edge Projection	Spacing between UT measurements (in feet):	**19.6**	Quantity of UT measurements:	**8**	
☐	☒	Other internal or external bottom UT (specify):					
☒	☐	Visual (VT) inspection of bottom plates					
☒	☐	Pit gauging performed					

Y	N/A	Areas restricted from MFL examination coverage due to physical limitations include:					
☒	☐	Near the Shell-to-Bottom and Plate-to-Plate Lap Welds					
☐	☐	At Roof Support Column(s)					
☐	☐	At Floating Roof Supports					
☐	☐	Near and Under the Automatic Gauge Base					
☐	☐	Under Internal Piping					
☐	☐	Near the Sump(s)					
☐	☐	Gauge Pole(s)					
☒	☐	Existing Patch Plates (Include patch plates on layout)					
☐	☐	Anti-Rotation Device(s)					
☐	☐	Coils Description -	Type:		Diameter:		
☒	☐	Other (describe): 14 inch diameter nozzle on plate 14					

Y	N/A	Technical limitations associated with MFL scanning (Describe limitations in the space provided):
☒	☐	☐ Oil / ☐ Dirt / ☒ Debris / ☐ Rust / ☒ Scale / ☐ Product Residue / ☒ Other (Describe): Ice

☐	☒	Residual water (ponding):

☐	☒	Excessive and / or Variations in Coating Thickness:

☒	☐	Undulations (Waviness) in Bottom Plates: **The bottom would sag when scanning floor plates causing the sensor bar to rub.**

☐	☒	Edge Settlement:

☒	☐	Numerous Existing Lap Welded Patch Plates:

☐	☒	Severe Product Side Pitting:

☐	☒	Describe any other limitations not previously listed:

☐	☒	Were these limitations discussed with the Client prior to continuing the bottom scan?

Y	N/A	Bottom Plate Welds - The tank bottom plate lap welds were examined utilizing the following inspection methods:		
☐	☒	Vacuum Box (LT/BT) testing	Number of Product Leak Paths:	
☐	☒	Magnetic Particle (MT) testing	Number of Recordable Indications:	
☐	☒	Alternating Current Field Measurement (ACFM)	Number of Recordable Indications:	
☒	☐	Visual (VT) inspection	Number of Recordable Indications:	**0**

☒	☐	Overall condition of lap welds:	**Coated limiting the visual inspection.**

☐	☒	Other (describe):

HMT Inspection	HMT Job No.	26281659
API 653 Inspection Checklist	Tank No.	North Water Tank

Y	N/A	Areas restricted from LT/BT examination coverage due to physical limitations include:
☐	☒	At roof support column(s)
☐	☒	At floating roof supports
☐	☒	Automatic gauge base
☐	☒	Under internal piping
☐	☒	Near the sump(s)
☐	☒	Near Bottom Edge Settlement
☐	☒	Other (describe):

Y	N/A	Shell-to-Bottom Weld Examination – The internal / external Shell-to-Bottom weld(s) were examined utilizing the following:				
☐	☒	Magnetic Particle (MT) testing	☐ Internal	☐ External		
☐	☒	Weld Preparation:	☐ Abrasive Blast	☐ Wire Wheel	☐ Hydro Blast	☐ Other
☐	☒	Number of Recordable Indications:				
☐	☒	Comments:				

☐	☒	ACFM testing	☐ Internal	☐ External		
☐	☒	Weld Preparation	☐ Abrasive Blast	☐ Wire Wheel	☐ Hydro-Blast	☐ Other
☐	☒	Coating Condition		Thickness		
☐	☒	Number of Recordable Indications:				
☐	☒	Comments:				

☐	☒	Vacuum Box (LT/BT) testing

☐	☒	Weld Preparation:	☐ Abrasive Blast	☐ Wire Wheel	☐ Hydro-Blast	☐ Other

☐	☒	Number of Product Leak Paths:	

☒	☐	Visual (VT) inspection	☒ Internal	☒ External
☒	☐	Limitations: **Internal coating and External limited by vegetation, snow and ice.**		

Y	N/A	Sump Examination - The tank sump(s) were examined utilizing the following inspection methods:					
☐	☒	**API Standard Sump:** Diameter:		Depth:		Nominal Thickness:	
☐	☒	Sixteen (16) Ultrasonic (UT) thickness readings were taken along the wall and ten (10) Ultrasonic (UT) readings were taken across the bottom in an "X" pattern.					
☐	☒	**Dish-Style:** Diameter:		Depth:		Nominal Thickness:	
☐	☒	Twenty (20) Ultrasonic (UT) thickness readings were taken across the bottom in an X-pattern.					
☐	☒	100% UT of Sump					
☐	☒	Other UT of sump (Specify):					
Y	**N/A**	**The following Items refer to both style sumps:**					
☐	☒	Random 6-inch x 6-inch Ultrasonic (UT) scrubs of the bottom and wall.					
☐	☒	Readings detected significantly lower than nominal. If so, detail findings:					
☐	☒	Visual (VT) inspection welds, bottom and wall condition. Note weld quality and surface condition.					

☐	☒	Quantity and range of product side pitting:	pits, to inch deep
☐	☒	Magnetic Particle (MT) testing of sump welds	
☐	☒	Quantity of Recordable MT Indications:	
☐	☒	Liquid Penetrant (PT) testing of sump welds	
☐	☒	Quantity of Recordable PT Indications:	

☐	☒	Describe limitations of Visual (VT) inspection or UT testing:	
☐	☒	Other Inspection methods performed (describe):	
Y	**N/A**	**Shell Manway / Nozzle Examination – The tank shell manways / nozzles were examined utilizing the following methods:**	
☒	☐	**4**	Ultrasonic (UT) thickness readings per accessible manway / nozzle neck were taken.
☒	☐	**1**	UT thickness readings per accessible manway / nozzle reinforcing plate, flange & cover (when present) were taken.
☐	☒	MT of manway / nozzle neck(s)	☐ Internal ☐ External
☐	☒	MT of manway / nozzle reinforcing plate(s)	
☐	☒	PT of manway / nozzle neck(s)	☐ Internal ☐ External
☐	☒	PT of manway / nozzle reinforcing plate(s)	
☐	☒	ACFM of manway / nozzle neck(s)	☐ Internal ☐ External
☐	☒	ACFM of manway / nozzle reinforcing plate(s)	
☒	☐	VT of manway / nozzle neck(s)	☒ Internal ☒ External
☒	☐	VT of manway / nozzle reinforcing plate, flange, cover(s)	
☐	☒	Pressure test of manway / nozzle reinforcing plate(s)	Maximum PSIG:
☐	☒	Pressure test type:	☐ Pneumatic ☐ Inert Gas ☐ Other (describe):
☐	☒	Pressure test duration	Start time: Stop time:

Y	N/A	Shell Plate Examination – The tank shell plates were examined utilizing the following methods:
☒	☐	Random Ultrasonic (UT) readings were taken ☐ Internal ☒ External
		Automated UT (ref. HMT NDT Procedure 1611.3)
☐	☒	Automated UT (B-Scan)
☐	☒	equally spaced drops were performed counterclockwise starting at Manway A
☐	☒	Comments / Limitations for B-scan (wind girder, stiffening ring, etc.):
		Telescopic pole:
☐	☒	equally spaced pole drops were performed counterclockwise starting at Manway A
☐	☒	Thickness readings per course were taken.
		Ultrasonic (UT) readings were taken from the spiral stairway / vertical ladder:
☒	☐	**3** Readings per course were taken up ☐ spiral stairway ☐ vertical ladder
		Random Ultrasonic (UT) of:
☐	☒	Course 1 Shell Plates - readings were taken per plate.
☐	☒	Course 2 Shell Plates - readings were taken per plate.
☐	☒	CMLs Installed **(Insulated Tank):** Quantity per course Quantity overall:
☐	☒	CMLs Installed **(Un-insulated Tank):** Quantity per course Quantity overall:
☐	☒	CML locations documented on nozzle table
☐	☒	CML type: Other (describe):
☒	☐	Describe any limitations experienced while performing shell UT: **3 shell UTs performed on course 1 at quadrants N, S, E, and W, and 3 per course performed on the west side of the tank from the manlift basket.**
☒	☐	Visual (VT) inspection of shell plates ☒ Internal ☒ External
☐	☒	Comments / Limitations:

Y	N/A	Fixed Roof Plate Examination – The fixed roof plates were examined utilizing the following methods:
☒	☐	**3** Ultrasonic (UT) thickness readings were taken per plate
☐	☒	Ultrasonic (UT) thickness reading(s) was/were taken per plate / every _____ feet in an "X" pattern.
☐	☒	Ultrasonic (UT) thickness readings were taken per fixed roof nozzle neck.
☒	☐	Visual (VT) inspection of fixed roof ☒ Internal ☒ External
☒	☐	Nominal Fixed Roof Plate Thickness: **0.188 inch**
☐	☒	CMLs Installed **(Insulated Tank):** Quantity overall:
☐	☒	CMLs Installed **(Un-insulated Tank):** Quantity overall:
☐	☒	CML locations documented on layout
☐	☒	CML type: Other (describe):
☒	☐	Comments / Limitations: **Dome roof UT readings recorded from the manlift basket.**

Y	N/A	Floating Roof Plate Examination – The floating roof plates were examined utilizing the following methods:
☐	☒	Ultrasonic (UT) thickness readings were taken per plate
☐	☒	Ultrasonic (UT) thickness reading(s) was/were taken per plate / every feet in X pattern.
☐	☒	Ultrasonic (UT) thickness readings were taken per floating roof nozzle neck.
☐	☒	Nominal Floating Roof Plate Thickness:

Y	N/A	Floating Roof Plate Examination – The floating roof plates were examined utilizing the following methods (Cont'd.):
☐	☒	Visual (VT) inspection of floating roof performed.
☐	☒	Comments / Limitations:

Y	N/A	Floating Roof Pontoon – The floating roof pontoon plates were examined utilizing the following methods:	
☐	☒		Ultrasonic (UT) readings were taken per pontoon plate
☐	☒		Ultrasonic (UT) readings were taken per pontoon outside rim plate
☐	☒		Ultrasonic (UT) readings were taken per pontoon inside rim plate
☐	☒	Visual (VT) inspection of floating roof pontoon welds performed.	
☐	☒	Comments / Limitations:	

Y	N/A	UT Documentation - Bottom, Sump(s), Shell, Roof(s), Nozzle(s)
☐	☒	UT thickness measurements downloaded to an Excel spreadsheet.
☐	☒	UT thickness measurements handwritten on separate forms.
☐	☒	Bottom / Roof plate UT thickness measurements cross-referenced with number of plates on layout(s) for accuracy.
☐	☒	Type (point readings / scrubs) and quantity of UT verified with scope of work / proposal.

Inspection Data

List All Personnel On Site
(full names for final report purposes):

Y	N/A	Method	Performed By
☒	☐	MFL	**Garrett Brown**
☐	☒	AMMFL	
☐	☒	MFL (Mini-scanner)	
☐	☒	SLOFEC	
☒	☐	BOTTOM REDUCTION	**Aaron Crum & Garrett Brown**
☒	☐	UT	**Aaron Crum**
☐	☒	AUT (CDE)	
☐	☒	MT	
☒	☐	VT	**Aaron crum**
☐	☒	ACFM	
☐	☒	LT/BT	

Inspection Data (Cont'd.)

Y	N/A	Method	Performed By
☐	☒	LT/PO	
☐	☒	PT	
☐	☒	Holiday Testing	
☒	☐	Photos Taken	**Aaron Crum**
☒	☐	Nozzle Table Completed	**Aaron Crum**
☒	☐	Bottom Layout Drawn	**Garrett Brown**
☒	☐	Fixed Roof Layout Drawn	**Garrett Brown**
☐	☒	Floating Roof Layout Drawn	
☐	☒	Other Drawing(s)(Specify Type):	

Equipment

Y	N/A	Magnetic Flux Leakage (MFL)
☒	☐	Performed in accordance (HMT MFL Procedure No. 1611.04 / 1611.05 / 1611.06 / 1611.24 / 1611.25)
☐	☒	HMT I-1 Bottom Scanner (HMT Procedure No. 1611.06).
☐	☒	3D MFL Mapper Scanner (HMT Procedure No. 1611.24).

☒	☐	MFE Enterprises Floorscanner Type 2412 (HMT Procedure No. 1611.05).
☐	☒	HMT Mini I-1 Bottom Scanner (HMT Procedure No. 1611.25).
☐	☒	RTD mini-scanner (HMT Procedure No. 1611.04).
☐	☒	Other (describe):

Y	N/A	Ultrasonic (UT)			
☐	☒	Performed in accordance with HMT UT Procedure No. 1611.01			
☐	☒	GE / Krautkramer Branson Flaw Detector Model:		Serial No.:	
☐	☒	Panametrics Model:		Serial No.:	
☒	☐	Other (Describe Mfg. & Model):	**USM GO**	Serial No.:	**20060134**

☐	☐	**Dual element** Model:		Dia.		Freq.	
☐	☐	**Single element** Model:		Dia.		Freq.	

☐ BRITEK, 7.5 MHz, 0.375 in., **dual element**	☐ GE / KBA CA 215, 5.0 MHz, 0.250 in., **single element**
☒ BRITEK, 7.5 MHz, 0.312 in., **dual element**	☐ GE / KBA FH2E-WR, 7.5 MHz, 0.375 in., **dual element**
☐ NDT Systems, 5.0 MHz, 0.250 in., **dual element**	☐ Xactex, 5.0 MHz, 0.250 in., **single element**
☐ Harisonic CM0504-S, 5.0 MHz, 0.250 in., **single element**	☐ Technisonic CF-0503-GP, 5.0 MHz, 0.250 in., **single element**
☐ Other **dual element** (Describe):	☐ Other **single element** (Describe):

☐	☒	Crawler Data Evaluation (CDE) B-Scan performed in accordance with HMT UT Procedure No. 1611.03		
☐	☒	ScanTech Instruments, Inc. – Model: ☐ X1B ☐ C2 ☐ Spider	Serial No.:	
☐	☒	Other B-scan equipment (describe):		

Equipment (Cont'd.)

Y	N/A	Calibration Blocks
☒	☐	5-step, carbon steel test block (0.100 inch to 0.500 inch).
☐	☒	Tipsy Step Block, 1018 carbon steel (1-inch to 4.5-inches in 0.500 inch increments).
☐	☒	5-step, 304 stainless steel test block (0.100 inch to 0.500 inch).
☐	☒	5-step, aluminum test block (0.100 inch to 0.500 inch).
☐	☒	5-step, test block (0.100 inch to 0.500 inch). Describe alloy (Inconel, Monel, other):
☐	☐	Other (describe):

Y	N/A	Couplant
☒	☐	Echogel 20 as couplant
☐	☒	High-temperature couplant (describe):
☐	☒	Water
☒	☐	Other (describe): **Windshield washer fluid for UT scrubs on tank bottom**

Y	N/A	Pit Gauging		
☒	☐	W.R. Thorpe Co. standard pipe pit gauge		
☐	☒	Fillet gauge	Make:	
☐	☒	V-WAC gauge	Make:	
☐	☒	Other (describe):		

Y	N/A	Vacuum Box (LT/BT)
☐	☒	Performed in accordance with HMT LT/BT Procedure No. 1611.10
☐	☒	American Seam Tester, Series A 100 (Flat) or equivalent
☐	☒	American Seam Tester, Series A 300 (Corner) or equivalent
☐	☒	Other (describe):

Y	N/A	Liquid Penetrant (PT)	
☐	☒	Performed in accordance with HMT PT Procedure No. 1611.14 (Solvent Removable)	
☐	☒	Performed in accordance with HMT PT Procedure No. 1611.15 (Water Washable)	
		☐ Solvent	☐ Water Washable
		☐ Visible	☐ Florescent

	Manufacturer of PT Materials:			
	Brand Name of Liquid Penetrant Used:			
	Solvent / Cleaner Batch Number			
	Penetrant Batch Number		Color	
	Developer Batch Number		Color	

Equipment (Cont'd.)

Y	N/A	Alternating Current Field Measurement (ACFM)		
☐	☒	Performed in accordance with HMT ACFM Procedure No. 1611.18		
☐	☒	AMIGO		
☐	☒	Other (describe):	Make & Model:	
			Serial Number:	
			Probe Serial Number:	

Y	N/A	Magnetic Particle (MT)			
☐	☒	Performed in accordance with HMT MT Procedure No. 1611.08			
☐	☒	Parker Probe Model B-300 (AC)		Serial No.	
☐	☒	Parker Probe Model DA-400 (AC/DC)		Serial No.	
☐	☒	Other Model		Serial No.	
☐	☒	Magnetizing Process	☐ Continuous		☐ Residual

☐	☒	Blacklight - Spectroline, Model BIB-150B		
☐	☒	Other Blacklight (describe Make & Model)		
☐	☒	Blacklight Intensity Meter – Spectroline, Model DM-365XA		
☐	☒	Other Blacklight Intensity Meter (describe Make & Model)		
☐	☒	Blacklight Intensity Meter	Serial No.	

☐	☐	Ten (10) Pound Test Weight

☐	☒	Magnetic Dusting Powder
Manufacturer of MT Particles:		

		☐ Wet – Batch Number			Color	
		☐ Dry – Batch Number			Color	
		☐ Visible – Batch Number			Color	
		☐ Fluorescent – Batch Number			Color	
☐	☐	Particle Application Method:	☐ Bulb	☐ Spray	☐ Bath	
☐	☐	White Contrast				
☐	☐	Other (describe):				

Equipment (Cont'd.)

Y	N/A	Laser Level / Total Station
☐	☒	Topcon Marksman RL-H3C self-leveling rotating laser.
☐	☒	Topcon Marksman RL-H4C self-leveling rotating laser.
☐	☒	Leica Rugby 100 self-leveling rotating laser.
☐	☒	Spectra Precision LL300 self-leveling rotating laser.
☐	☒	Other (describe Make & Model):
☐	☒	Serial No of Rotating Laser Level:
☒	☐	Topcon Total Station (Model & Serial No.): **RL-HAS & 1A050055 (Calibrated 11/18/2022)**
☐	☒	Leica Total Station (Model & Serial No.):

Y	N/A	Additional Work Performed
☐	☒	Helium Mass Spectrometer Leak (MSLT) testing, performed in accordance with HMT Procedure No. 1611.13 **(Complete MSLT Checklist).**
☐	☒	Kontroll Technik Saturated Low Frequency Eddy Current (SLOFEC) scanning of the tank bottom for the detection of significant product side or soil side metal loss performed in accordance with HMT Procedure No. 1611.07 **(Complete SLOFEC Checklist).**
☐	☒	Verticality inspection performed in accordance with HMT Procedure No. 1611.19 **(Complete Verticality Checklist).**
☐	☒	Coating Inspection (Holiday Test), performed in accordance with HMT Procedure No. 1611.16
☐	☒	Leak Test Procedure Utilizing Penetrating Oil Technique (LT/PO), performed in accordance with HMT Procedure No. 1611.12
☐	☒	Other (describe):

Comments	(If any inspection was performed other than the typical in-service or out-of-service inspection, explain what was performed in the following section.)