TANK INDUSTRY CONSULTANTS

EVALUATION OF THE

250,000 GALLON WELDED STEEL SINGLE-PEDESTAL SPHEROID

"AVON STREET TANK"
DEER PARK, TEXAS

FOR

THE CITY OF DEER PARK

July 25, 2023

23.116.S1859.001

TIC
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August 4, 2023

SUBJECT:

The subject of this report is the field evaluation of the 250,000 gallon welded steel single-pedestal spheroid in Deer Park, Texas. The tank was owned by The City of Deer Park and was known as the "Avon Street Tank." The field evaluation was performed on July 25, 2023 by James A. Peyer, NACE Coating Inspector Level 3-Certified, Certificate No. 8743; and Davon L. Van Doren, NACE Coating Inspector Level 2-Certified, Certificate No. 63365 of Tank Industry Consultants. The Owner's representative on the site at the time of the field evaluation was Adam Anderson. According to information provided by the Owner, the tank had a capacity of 250,000 gallons.

OBJECTIVE:

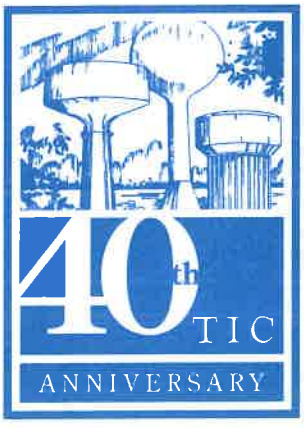
The purpose of this evaluation was to determine the condition of the tank interior wet, interior dry, exterior, exposed foundation, and accessories. The purpose of this report is to present the findings, to identify structural, sanitary, and safety deficiencies of the evaluation, and to make recommendations for recoating, repairing, corrosion protection, and maintenance. Budget estimates for the work, anticipated life of the coating and the structure, and the replacement cost of the tank are also included.

AUTHORIZATION:

This evaluation and report were authorized in the Standard Agreement dated July 24, 2023 signed by Gregory R. Stein, P.E. of Tank Industry Consultants and Brent Costlow, Assistant Director of Public Works for the City of Deer Park.

EXECUTIVE SUMMARY:

The exterior coating system appeared to be in good overall condition with only minor corrosion observed on isolated areas of the roof. Tank Industry Consultants believes that the exterior surfaces should not need to be painted within the next 5 to 7 years from a corrosion standpoint. However, the exterior surfaces should be reevaluated within the next 3 to 5 years, in accordance with AWWA recommendations, to determine a precise recoating schedule. The coating on the interior dry surfaces of the tank appeared to be in fair to good overall condition as corrosion was observed on areas of the condensate platform and top platform. The interior wet coating system appeared to be in fair overall condition as corrosion and rust staining were observed on areas of the roof and stiffeners. Corrosion, rust tubercles, and rust staining were observed on areas of the bowl. Tank Industry Consultants recommends that the interior dry and interior wet surfaces of this tank should be recoated within the next 3 to 4 years. The concrete floor of the base cone was severely damaged. Therefore, the concrete floor should be repaired or replaced as soon as possible.



ANSI/OSHA and Safety-Related Deficiencies: There were OSHA and safety-related deficiencies observed on this tank. These deficiencies included:

- the uncovered conduit junction box and broken conduit near the bottom of the base cone exposed wiring,
- the roof safety railing toe bar height was inadequate (OSHA 29 CFR 1910.29(k)(1)(ii)),
- the gap between the roof safety railing toe bar and the roof was too large (OSHA 29 CFR 1910.29(k)(1)(iii)),
- an uncovered cabinet and several broken conduits and cables exposed wiring at the damaged concrete floor of the base cone,
- the sand, debris, and conduits on the damaged concrete floor crated a trip hazard,
- the ladder head clearance at the condensate platform manhole, top platform manhole, and access tube roof manhole was inadequate (OSHA 29 CFR 1910.23(d)(13)(ii)),
- the discontinuous side rails at the support column ladder sections created a hazard for the climber (OSHA 29 CFR 1910.22(a)(3)),
- the cables and conduit attached to the support column ladder brackets and side rails, access tube ladder brackets and side rails, and interior wet container ladder brackets could interfere with the climber's use of the side rails (OSHA 29 CFR 1910.23(d)(13)(i)),
- corrosion was observed on the interior wet container ladder safe-climbing device and its brackets which may not allow the device to function properly, and
- the PVC piping extending behind the interior wet container ladder could interfere with the toe room behind the ladder (OSHA 29 CFR 1910.23(d)(2)).

It is recommended that safety deficiencies be corrected for compliance with OSHA and safety-related standards. If these deficiencies are not corrected, TIC recommends that no personnel, contractors, or services providers are allowed access to the tank without a detailed safety plan that mitigates the noted safety-related deficiencies.

AWWA, TCEQ, Sanitary, and Operational Deficiencies: There were TCEQ, sanitary, and operating deficiencies observed on this tank as well. These deficiencies included:

- the overflow pipe discharged near the top of the support column which allowed the potential of accelerated corrosion on the support column and base cone and the erosion of the soil due to effluent discharge,
- the overflow pipe projection from the support column was inadequate,
- the discharge end of the overflow pipe was not equipped with protective screening,
- the coupling with the broken plug and an open coupling in the roof would allow the ingress of rain water run-off, birds, and insects into the tank,
- the container roof manhole cover did not fully close and it's locking hasps were misaligned,
- the container roof manhole cover was not locked,
- the roof vent was not of a clog-resistant design,
- the roof vent was not screened which would allow the ingress of birds and insects into the tank,
- the concrete floor of the base cone was severely damaged and the underlying fill disturbed, and
- the access tube stiffeners below the top capacity level were not seal welded to the access tube.

These deficiencies should be corrected.

The safety-related, sanitary, and operating deficiencies listed above are not intended to be a complete list of deficiencies on this tank. The Owner should refer to the complete report text and accompanying photographs for a complete account of all observed deficiencies.

This evaluation and the reporting of the condition of this tank do not warrant the original structural condition of the tank or any of the original design for seismic loadings. Likewise, recommendations for this tank do not include modifications that may be required for compliance with present structural codes.

PHOTOGRAPHS:

Color photographs were taken of the visible portions of the site, foundation, the tank interior wet, interior dry, and exterior and are included as a part of this report. The significant photographs are keyed to the observations.

NOMENCLATURE:

The terms used in describing the various components of steel water tanks are unique to the industry. In fact, the terms vary from firm to firm and from person to person. In an attempt to define the terms used in this report, a sketch of the general type of tank covered is included at the end of the narrative portion of this report. **Warning: Some appurtenances on this tank may be referred to as erection or rigging attachments, lugs, or brackets. This does not mean that they are safe for rigging. Each attachment for each tank should be evaluated on an individual basis by a structural engineer or an experienced rigger before being used. These devices may have been intended for only the original erectors and painters to use with specialized equipment**.

ADHESION TESTS:

All adhesion tests performed during this evaluation were done in general accordance with ASTM D3359. The results are reported herein using the ASTM scale. The ASTM scale is a relative scale to rate adhesion from 0 to 5 with 5 being the best. A table of adhesion test results classification is included with this report following the sketch of the tank.

HEAVY METALS TESTS:

Samples of the exterior, interior wet, and interior dry coating systems were sent to a laboratory for inductively coupled plasma-atomic emission spectrometry analyses. The test results were as follows:

	Cadmium		Chromium		Lead	
	mg/kg	percent	mg/kg	percent	mg/kg	percent
Exterior	<25	<0.0025%	<250	<0.025%	<250	<0.025%
Interior Wet	<25	<0.0025%	<250	<0.025%	<250	<0.025%
Interior Dry	<25	<0.0025%	<250	<0.025%	<250	<0.025%

Tank Industry Consultants performs this test only to determine if there is lead, cadmium, or chromium present in the coating samples. To limit damage to the existing coating, only small areas were tested. The small number of samples taken and the difficulty of retrieving all primer from the steel profile may cause the tests performed to not accurately represent the total coating system. Variations in thickness, types of coatings applied, and the interim cleaning and painting operations will also affect the actual readings. The reliability of the results is also dependent on the amount of primer included in the sample. Additional testing to determine the amount of leachable contaminants present in the spent cleaning debris will need to be performed following cleaning operations at the time of repainting. Results from the laboratory analysis are included following the adhesion tables.

ULTRASONIC THICKNESS MEASUREMENTS:

Roof:	(all readings were taken through coating)
Cap:	0.239 in. to 0.245 in.
Finger:	0.283 in. to 0.285 in.
Knuckle:	0.220 in. to 0.223 in.
Access Tube:	
Top Can:	0.290 in. to 0.301 in.
Bottom Can:	0.296 in. to 0.301 in.
Bowl Knuckle:	0.673 in. to 0.680 in.
Top Platform:	0.321 in. to 0.326 in.
Support Column:	
Ring #7:	0.845 in. to 0.849 in.
Ring #6:	0.849 in. to 0.856 in.
Ring #5:	0.855 in. to 0.860 in.
Ring #4:	0.872 in. to 0.880 in.
Ring #3:	0.861 in. to 0.869 in.
Ring #2:	0.921 in. to 0.925 in.
Ring #1: (bottom)	0.910 in. to 0.923 in.
Condensate Ceiling:	0.320 in. to 0.324 in.
Base Cone-to-Support Column Girder:	1.059 in. to 1.062 in.
Bae Cone:	
Ring #5:	0.932 in.
Ring #4:	0.873 in.
Ring #3:	0.770 in. to 0.772 in.
Ring #2:	0.730 in. to 0.731 in.
Ring #1: (bottom)	0.733 in. to 0.735 in.

OBSERVATIONS:

A. Foundation and Site

SITE:

Size: approx. 90 ft x 120 ft
Fence:
Type: chain link, with 3 strands of barbed wire
Height: 6 ft
Gate:
Location: south side of site
Width: 16 ft
Locked: yes

Adjacent Structures:
Type: electrical cabinets
Direction: east
Distance: approx. 27 ft

Type: building
Direction: southwest
Distance: approx. 30 ft

Type: churches
Direction: north and east

Type: playground
Direction: west

Type: residences
Directions: north, south, east, and west

Nearest Overhead Power Lines: south, east, and north of tank site

FOUNDATION:

Type: concrete ringwall
Projection Above Grade:
North: 1-1/2 in. to 3-1/2 in.
South: 0 in. to 1-1/2 in.
East: 0 in. to 1/2 in.
West: 0 in. to 2 in.
Grout: 1-1/2 in. to 1-3/4 in.
Sealant: none visible

1. **Site Location**: The tank was located off of Avon Street in Deer Park, Texas. Residences and trees were located around the tank site. Churches were located to the north and east of the tank site. A playground was located west of the tank site. Overhead power lines were located to the south, east, and north of the site. A utility pole was located on the southeast side of the site, and lights, an antenna, and equipment were attached to the utility pole. The proper operation of the lights was not verified at the time of the field evaluation. (See photos 1-5)

2. **Site Conditions**: The tank site was covered with well-maintained grass and was not graded to provide adequate drainage away from the foundation. The tank site was fenced. The chain link fence was topped with barbed wire and was equipped with a locked gate on the south side of the site. The fence appeared to be in good overall condition. Information and warning signs were located on the fence. A fire hydrant was located to the south of the site, outside the fence. Buildings were located on the southeast and southwest sides of the site. Electrical cabinets were located on the east side of the site. Piping was located on the south side of the site, and the coating on the piping appeared to be in good overall condition. (See photos 1-6)

3. **Foundation**: The tank foundation appeared to be a concrete ringwall. Except for exposed aggregate and bug holes, the exposed surface of the foundation appeared to be in nearly its original structural condition at the time of this field evaluation. The foundation did not exhibit the AWWA recommended 6 in. minimum projection above grade. White coating was visible on the top side of the exposed concrete surfaces at the time of this field evaluation. Conduits and piping extended from below grade and penetrated the foundation on the west side. (See photos 7-11)

4. **Grout**: There was a pad of grout between the tank base plate and the concrete foundation. The grout appeared to be in adequate condition but was undercut in areas. White coating was visible on the grout. There was no sealant located at the grout-to-base plate interface. (See photos 8-11)

B. Exterior Surfaces

DESCRIPTION:
- Construction: welded steel
- Type: spheroid

BASE PLATE:
- Projection: 3 in. to 4 in. from base cone
- Thickness: 2-1/4 in.

ANCHOR BOLTS:
- Number: 20
- Size: 1-3/4 in. diameter
- Chairs:
  - Height: 6-1/2 in.
  - Width: 3 in. (i/s - i/s)
  - Top Plate Dimensions: 4-1/4 in. x 6 in. x 1 in. thick
  - Side Plate Dimensions: 3-3/4 in. to 5-1/4 in. x 5-1/2 in. x 1/2 in. thick

PERSONNEL ACCESS DOOR:
- Size: 2 ft 6 in. x 5 ft
- Locked: yes

OVERFLOW PIPE:
- Size: 8 in. diameter
- Type: stub
- Projection From Support Column: 6 in.
- Visible Air Break: yes
- Flap Gate: yes
- Protective Screening: none

PAINTER'S MANHOLE:
- Size: 20 in. diameter
- Cover Hinged: exterior of support column
- Locked: no
- Pinned: yes

PAINTER'S RAILS:
- Number: 2
- Locations: above and below the painter's manhole
- Size: 1-1/4 in. diameter
- Brackets: 1-1/4 in. diameter

SIGNS: "**DEER PARK"**
- Number: 2
- Color: dark brown
- Height: 6 ft in. tall letters
- Letter Width: 3 ft 2 in.
- Brush Stroke: 3 in. to 8 in.

ROOF SAFETY RAILING:
- Location: around the roof cap
- Handrail:
  - Height: 42 in.
  - Size: 2-1/4 in. diameter
- Uprights: 2-1/4 in. diameter
- Mid-Rail: 2-1/4 in. diameter
- Toe Bar:
  - Size: 3 in. x 3/16 in., flat bar
  - Gap Between Toe Bar and Roof: 2 in. to 3 in.
- Access Opening: none

ROOF OPENINGS:

Access Tube Manhole:

Size: 30 in. diameter
Type: hinged
Curb: 6 in. x 1/4 in. thick
Welded: exterior only
Overlap: 2 in. x 1/4 in. thick
Locked: no

Container Manhole:

Size: 30 in. diameter
Type: hinged
Curb: 6 in. x 1/4 in. thick
Welded: exterior only
Overlap: 2 in. x 1/4 in. thick
Locked: no

Roof Vent:

Neck Height: 14 in.
Neck Diameter: 24 in.
Screening: none
Cover: approx. 4 ft diameter

ROOF OBSTRUCTION LIGHTS:

Type: double-globe
Location: attached to access tube roof manhole flange
Manufacturer: TWR Lighting
Model Number: L-820
Serial Number: SN 48281-2
Operational: unknown
Photoelectric Cell:

Location: below the obstruction lights
Orientation: north

EXTERIOR COATING AND METAL CONDITION:

	Coating Thickness		Approx. % Failure to		Adhesion	Metal Loss	
	Range	Typical	Underlying Coating	Rust		Typical	Deepest
Base Cone	9.8 mils to 14.2 mils	12 mils	Neg.	< 1/2%	4 S	Neg.	Neg.
Support Column	8 mils to 12.7 mils	10.6 mils	Neg.	Neg.	5 S	Neg.	Neg.
Bowl	10 mils to 14.6 mils	-	Neg.	Neg.	5 S	Neg.	Neg.
Shell	9.8 mils to 15.4 mils	-	Neg.	Neg.	5 S	Neg.	Neg.
Roof	12.7 mils to 22.5 mils	17.6 mils	< 1/2%	< 1/2%	4 S	Neg.	Neg.

Key to Table

Adhesion 5 (very good)
4 (good)
3 (fair)
2 (poor)
1 (very poor)
0 (very poor)

T = Topcoat to Underlying Coating

S = Primer to Steel

Neg. = negligible

1. **Exterior Coating Condition**: The white coating on the exterior of the tank appeared to be in good overall condition with only minor corrosion observed on isolated areas of the roof. The exterior coating had good to very good adhesion to the steel. The finish coat appeared to be a polyurethane coating.

2. **Base Plate**: The base plate projection appeared to be in good overall condition at the time of the field evaluation. (See photos 7-11)

3. **Anchor Bolts and Chairs**: The tank was equipped with twenty anchor bolts and anchor bolt chairs. No significant coating failure or corrosion was observed on the anchor bolts. The chairs were sealed with a welded steel front plate. Minor coating failure and corrosion were observed on the top plate of the chairs. (See photos 10-11)

4. **Base Cone Condition**: **There was a safety-related deficiency noted: the uncovered conduit junction box and broken conduit near the bottom of the base cone exposed wiring**. The base cone appeared to be appeared to be in nearly its original structural condition at the time of the field evaluation. No significant coating failure or corrosion was observed on the base cone. The exterior base cone coating had good adhesion to the steel. Dirt and mildew was observed on areas of the base cone. The base cone was equipped with a locked personnel access door on the south side. Information and warning signs were located on the access door. An uncovered conduit junction box connected to a broken conduit was located near the bottom of the base cone on the southeast side. A PVC pipe projected from near the bottom of the base cone on the west side. (See photos 7, 11-16)

5. **Overflow Pipe**: **There were sanitary, AWWA, TCEQ, and operational deficiencies noted: (1) the overflow pipe discharged near the top of the support column which allowed the potential of accelerated corrosion on the support column and base cone and the erosion of the soil due to effluent discharge, (2) the 6 in. overflow pipe projection from the support column did not meet the minimum required 12 in., and (3) the discharge end of the overflow pipe was not equipped with protective screening**. The overflow pipe exited near the top of the support column and immediately discharged. The discharge end was equipped with a flap gate but was not screened. Corrosion was observed on the interior of the overflow pipe discharge. (See photos 20-21)

6. **Support Column**: The support column was of welded steel construction and appeared to be nearly its original structural condition at the time of the evaluation. The coating appeared to be in good overall condition with no significant coating failure or corrosion observed; however, runs, drips, and debris were observed in the coating. The coating had very good adhesion to the steel. A painter's manhole and two painter's rings were located near the top of the support column. The painter's manhole was not locked but was pinned. A handle was located on the interior of the painter's manhole cover. A chain was welded to the reinforcing plate around the painter's manhole on the interior dry side of the support column. A hand hold was located above the painter's manhole on the interior dry side of the support column. One of the painter's rings was located below the painter's manhole, and the other was located above the manhole. The painter's rings were equipped with welded pipe brackets. The painter's ring above the painter's manhole was bent. **It is the opinion of Tank Industry Consultants that the painter's rings and hand hold should not be used for rigging purposes or personnel access.** (See photos 16-19, 74)

7. **Bowl Condition**: The coating on the bowl appeared to be in good overall condition with no significant coating failure or corrosion observed. The coating on the bowl had very good adhesion to the steel. Mildew was observed on the bowl. (See photos 22-24)

8. **Shell Condition**: The contour of the tank shell was good as no significant discontinuities were observed at the time of this field evaluation. The coating appeared to be in good overall condition with no significant coating failure or corrosion observed. The exterior shell coating had very good adhesion to the steel. Two dark brown-colored signs were located on opposite sides of the shell. The signs appeared to be in good overall condition. (See photos 24-27)

9. **Roof Safety Railing**: **There were safety-related and OSHA deficiencies noted: (1) the roof safety railing toe bar height of 3 in. did not meet the required 3-1/2 in. minimum height, and (2) the 2 in. to 3 in. gap between the roof safety railing toe bar and the roof was more than the maximum allowed 1/4 in**. The roof was equipped with a safety railing around the roof cap. The safety railing was constructed from welded pipe and flat bar members. The coating on the safety railing was in good condition with no significant coating failure or corrosion observed. Two antennas were attached to the roof safety railing on the east side. A surveillance camera was attached to the roof safety railing on the north side. The proper operation of the surveillance camera was not verified at the time of the field evaluation. (See photos 34-36)

10. **Roof Condition: There was a sanitary deficiency noted: the coupling with the broken plug and an open coupling in the roof would allow the ingress of rain water run-off, birds, and insects into the tank**. The contour of the roof was irregular as several indentations were observed in the roof. Minor corrosion was observed on isolated areas of the roof. The coating on the roof had chalked but had good adhesion to the steel. Twenty-four couplings were located in the roof. One of the couplings was open which would allow the ingress of rain water run-off, brids, and insects into the tank. The remaining couplings were threaded and plugged, but one of the plugs was broken which would allow the ingress of insects into the tank. Pitting which had occurred prior to the last repainting was observed on the roof around one of the threaded and plugged couplings. (See photos 28-33)

11. **Roof Manholes**: **There were safety-related, sanitary, AWWA, TCEQ, and operational deficiencies noted: (1) the container roof manhole cover did not fully close and it's locking hasps were misaligned, and (2) the container roof manhole cover was not locked**. The roof was equipped with one access tube manhole and one container manhole. The manholes were

equipped with a hinged cover. The roof manholes were not locked prior to or after this evaluation. The container roof manhole cover did not fully close and it's locking hasps were misaligned. The roof manhole covers were each equipped with a handle. The roof manholes were welded on the exterior only. Corrosion was observed on the curb of the container roof manhole. The coating on the interior of the container roof manhole cover was previously touched-up. Pitting which had occurred prior to the last repainting was observed on the access rube roof manhole curb. A significantly corroded chain penetrated the curb of the container roof manhole. Minor coating failure was observed around the access tube roof manhole curb. Conduits extended from the curb of the access tube roof manhole. Obstruction lights were attached to a bracket on the flange of the access tube roof manhole. (See photos 36-43)

12. **Roof Vent**: **There were sanitary, AWWA, TCEQ, and operational deficiencies noted: (1) the roof vent was not of a clog-resistant design, and (2) the roof vent was not screened which would allow the ingress of birds and insects into the tank**. The roof was equipped with a vent attached to a flanged opening. The roof vent flange was equipped with a gasket which appeared to be in adequate condition. Corrosion and metal loss were observed on the bolts and nuts at the flange. The roof vent was not screened which would allow the ingress of birds and insects into the tank. (See photos 44-46)

13. **Obstruction Lights**: A double-globe obstruction light fixture was mounted to a bracket attached to the flange of the access tube roof manhole. The obstruction light was equipped with a photoelectric cell that was mounted below the obstruction lights, facing north. The obstruction light was not illuminated at the time of this field evaluation. The proper operation of the obstruction lights was not verified at the time of the field evaluation. (See photos 36, 40)

C. Interior Dry Surfaces

BASE CONE:
- Size: approx. 33 ft
- Steel Thickness: 2-1/4 in.
- Floor:
  - Type: concrete
  - Thickness: 6 in.

BASE PLATE:
- Projection: 4 in.
- Thickness: 2-1/4 in.

PIPE PIT:
- Size: 5 ft x 6 ft x 5 ft deep
- Access: open
- Access Rungs:
  - Number: 4
  - Size: 1 in. diameter

INTERIOR LIGHTING: none

INLET/OUTLET PIPE:
- Size: 16 in. diameter x 0.255 in. to 0.259 in.
- Brackets:
  - Sizes: 12 in. x 10 in. x 3/8 in., I-beam, 12 in. x 10 in. x 1/2 in., I-beam, and 3 in. x 3 in. x 1/4 in., angle
  - U-Bolts: 7/8 in. diameter

OVERFLOW PIPE:
- Size: 8 in. diameter
- Brackets:
  - Size: 3 in. x 1/4 in., flat bar
  - Spacing: approx. 22 ft

BASE CONE LADDER:
- Number of Rungs: 38
- Distance From Bottom of Base Cone to Bottom Rung: 4 ft 6 in.
- Width: 16 in.
- Side Rails: 2-1/2 in. x 3/8 in., flat bar
- Rung Size: 3/4 in. square
- Rung Spacing: 12 in. on center
- Toe Room: open
- Head Clearance: 28 in.
- Brackets:
  - Construction: welded
  - Size: 2 in. x 2 in. x 1/4 in., angle
  - Spacing: approx. 11 ft
- Safe-Climbing Device: 3/8 in. diameter cable-type

CONDENSATE PLATFORM:
- Location: at the top of the base cone
- Size: 10 ft diameter
- Drain Holes: 3/8 in. diameter to 5/8 in. diameter
- Drain Pipe: 1-1/4 in. diameter
- Manhole:
  - Size: 30 in. diameter
  - Curb: 4 in. x 1/4 in. thick
  - Overlap: 2 in. x 3/16 in. thick
  - Closeable Cover: yes

SUPPORT COLUMN:
- Size: approx. 10 ft diameter
- Stiffener:
  - Size: 6 in. x 4 in. x 3/8 in., angle
  - Construction: top side intermittently welded to the support column

SUPPORT COLUMN LADDER:
- Number of Sections: 6
- Number of Rungs: 48
- Width: 16 in.
- Side Rails: 2-1/2 in. x 3/8 in., flat bar
- Rung Size: 3/4 in. square
- Rung Spacing: 12 in. on center
- Toe Room: 12 in.
- Head Clearance: 28 in.
- Brackets:
  - Construction: welded
  - Size: 3 in. x 3/8 in., flat bar
  - Spacing: approx. 2 ft to 5 ft
- Safe-Climbing Device: 3/8 in. diameter cable-type

TOP PLATFORM:
- Location: near top of support column
- Width: 43 in.
- Drain Holes: 7/8 in. diameter
- Manhole:
  - Size: 30 in. diameter
  - Curb: 4 in. x 3/16 in. thick
  - Overlap: 2 in. x 3/16 in. thick
  - Closable Cover: yes
- Handrail:
  - Height: 43 in.
  - Size: 2-1/2 in. x 2-1/2 in. x 1/4 in., angle
- Uprights: 2-1/2 in. x 2-1/2 in. x 1/4 in., angle
- Mid-Rail: 2-1/2 in. x 2-1/2 in. x 1/4 in., angle
- Toe Bar:
  - Size: 5 in. x 1/4 in., flat bar
  - Height Above Platform: 4-3/4 in.
  - Gap Between Toe Bar and Platform: none

VENTILATION MANHOLE:
- Location: access tube
- Type: double-crab
- Size: 12 in. x 18 in.
- Bolts:
  - Number: 2
  - Size: 7/8 in. diameter x 10 in. long
- Cover Plate:
  - Size: approx. 14 in. x 20 in. x 0.515 in. thick
  - Hinged: no

ACCESS TUBE SIZE: approx. 3 ft 6 in. diameter

ACCESS TUBE LADDER:
- Number of Rungs: 56
- Width: 16 in.
- Side Rails: 2-1/2 in. x 3/8 in., flat bar
- Rung Size: 3/4 in. square
- Rung Spacing: 12 in. on center
- Toe Room: 10 in.
- Head Clearance: 30 in.
- Brackets:
  - Construction: welded
  - Size: 3 in. x 3/8 in., flat bar
  - Spacing: approx. 7 ft
- Safe-Climbing Device: 3/8 in. diameter cable-type

INTERIOR DRY COATING AND METAL CONDITION:

	Coating Thickness		Approx. % Failure to		Adhesion	Metal Loss	
	Range	Typical	Primer	Rust		Typical	Deepest
Base Cone	10 mils to 14.7 mils	12.2 mils	Neg.	Neg.	3 S	Neg.	Neg.
Inlet/Outlet Pipe	6.6 mils to 16.8 mils	11.7 mils	Neg.	Neg.	3 S	Neg.	Neg.
Support Column	6 mils to 11.8 mils	9.4 mils	Neg.	Neg.	4 S	Neg.	Neg.
Dry Bowl	12.2 mils to 19.8 mils	15.6 mils	Neg.	Neg.	4 S	Neg.	Neg.
Access Tube	8 mils to 15.5 mils	-	Neg.	Neg.	3 S	Neg.	Neg.

Key to Table

Adhesion: 5 (very good), 4 (good), 3 (fair), 2 (poor), 1 (very poor), 0 (very poor)

T = Topcoat to Underlying Coating

S = Primer to Steel

Neg. = negligible

1. **Interior Dry Coating Condition**: The concrete floor of the base cone was severely damaged. The white coating on the interior dry surfaces appeared to be in fair to good overall condition as corrosion was observed on areas of the condensate platform and top platform. The interior dry coating had fair to good adhesion to the steel. The finish coat appeared to be a polyurethane coating.

2. **Base Cone Condition**: **There was an operational deficiency noted: the base cone concrete floor was severely damaged and the underlying fill disturbed**. **There were safety-related deficiencies noted: (1) an uncovered cabinet and several broken conduits and cables exposed wiring at the damaged concrete floor of the base cone, and (2) the sand, debris, and conduits on the damaged concrete floor crated a trip hazard**. The coating on the interior of the base cone appeared to be in good overall condition with no significant coating failure or corrosion observed. The interior dry base cone coating had fair adhesion to the steel. The base plate projection appeared to be in adequate condition at the time of the field evaluation. The base cone floor was constructed of concrete and approximately half of the floor was severely damaged. The underlying fill was disturbed. An uncovered cabinet and broken conduits and cables exposed wiring at the damaged

concrete floor. Piping was exposed below the damaged concrete floor. Significant silt and debris were observed on the damaged floor and created a trip hazard. Cables extended up the base cone and through the condensate platform. (See photos 47-55, 60-61)

3. **Pipe Pit:** An uncovered pipe pit was located in the concrete floor of the base cone. Four rungs embedded in the concrete wall of the pipe pit provided access into the pipe pit. The rungs were not checked for OSHA compliance. Minor corrosion was observed on the piping in the valve vault. Silt and water were observed in the bottom of the pipe pit. (See photos 55-58)

4. **Interior Dry Piping**: The inlet/outlet pipe extended up from the pipe pit in the base cone floor, through the condensate ceiling, up the support column, and penetrated the dry bowl. The coating on the inlet/outlet pipe appeared to be in good condition and had fair adhesion to the steel. The inlet/outlet pipe was equipped with an expansion joint within the pipe pit. The inlet/outlet pipe was supported by a concrete block on the base cone floor. The inlet/outlet pipe was equipped with welded steel brackets and was U-bolted to the support column stiffener. The condensate platform drain pipe extended from the condensate platform and penetrated near the top of the base cone. Spots of corrosion were observed on this drain pipe. The overflow pipe penetrated near the top of the access tube, extended down the access tube, and penetrated near the top of the support column. The overflow pipe was equipped with welded steel brackets. No significant coating failure or corrosion was observed on the overflow pipe and brackets. (See photos 55-61, 64, 66-67, 72-73, 75, 80, 83)

5. **Base Cone Ladder**: **There was a safety and ANSI/OSHA deficiency noted: the 28 in. base cone ladder head clearance at the condensate platform manhole did not meet the required 30 in. minimum**. The base cone was equipped with a ladder which provided access from the base cone floor to the condensate platform. The ladder was equipped with a cable-type safe-climbing device. The base cone ladder was welded to brackets that were welded to the base cone and condensate platform. The base cone ladder and brackets appeared to be in nearly their original structural condition at the time of this field evaluation. (See photos 62-63)

6. **Condensate Platform**: The condensate platform was located near the bottom of the support column. The coating on the condensate platform appeared to be in fair overall condition as corrosion was observed on areas of the condensate platform. Pitting which had occurred prior to the last repainting was observed on the condensate platform. The platform was equipped with drain holes of varying sizes which appeared to provide adequate drainage. The platform was equipped with a 1-1/4 in. diameter drain pipe opening. The drain pipe was not equipped with protective screening on the exterior. The platform access opening was equipped with a curb and closable cover. A handle was located on the interior of the condensate platform manhole cover. Minor corrosion was observed on the interior of the manhole cover. (See photos 63-65)

7. **Support Column Condition**: The interior dry coating on the support column appeared to be in good overall condition with no significant coating failure or corrosion observed. The support column coating had good adhesion to the steel. The support column was equipped with an angle stiffener which was intermittently welded to the support column. The inlet/outlet pipe was U-bolted to an angle bracket that was welded to the stiffener. (See photo 66, 70)

8. **Support Column Ladder**: **There were safety and ANSI/OSHA deficiencies noted: (1) the 28 in. support column head clearance at the top platform manhole did not meet the required 30 in. minimum, (2) the discontinuous side rails at the support column ladder sections created a hazard for the climber, and (3) the cables attached to the support column ladder brackets and**

side rails could interfere with the climber's use of the side rails. The support column was equipped with six ladder sections which provided access from the condensate platform to the top platform. The ladder was equipped with a cable-type safe-climbing device. The support column ladder was welded to brackets that were welded to the support column. The support column ladder and brackets appeared to be in nearly their original structural condition at the time of this field evaluation. Cables were attached to the ladder brackets and side rails. (See photos 68-70)

9. **Top Platform**: A platform was located near the top of the support column which provided access from the support column ladder to the access tube ladder and painter's manhole. The top platform was equipped with drain holes which did not appear to provide adequate drainage as corrosion was observed on areas of the platform. Dirt and debris were observed on the platform. A welded steel square patch plate was located on the platform adjacent to the access tube ladder. The platform access opening was equipped with a curb and closable cover. A handle was located on the interior of the manhole cover. The top platform was equipped with safety railing constructed of welded steel angle and flat bar members. Corrosion was observed on areas of the safety railing. (See photos 70-71)

10. **Dry Bowl Condition**: The coating on the dry bowl appeared to be in good overall condition with no significant coating failure or corrosion observed. The dry bowl coating had good adhesion to the steel. Mildew was observed on the bowl. (See photos 75-76)

11. **Ventilation Manhole**: There was a double-crab manhole located in the access tube. Access to the manhole was accomplished from the access tube ladder. The manhole cover was not equipped a hinged support on the interior dry side of the access tube. Minor corrosion was observed on the manhole crabs. (See photo 77)

12. **Access Tube Condition**: The coating on the access tube appeared to be in good overall condition with no significant coating failure or corrosion observed. The access tube coating had fair adhesion to the steel. Debris was observed in the coating. A pipe equipped with a valve penetrated the access tube. The access tube area around the pipe had been previously touched up. (See photos 77-79)

13. **Access Tube Ladder**: **There was a safety and ANSI/OSHA deficiency noted: the cables attached to the access tube ladder brackets and side rail could interfere with the climber's use of the side rails**. The access tube was equipped with a ladder which provided access from the top platform to the roof of the tank. The ladder was equipped with a cable-type safe-climbing device. The access tube ladder was welded to brackets that were welded to the access tube. The ladder and brackets appeared to be in nearly their original structural condition at the time of this field evaluation. Cables were attached to the ladder brackets and one of the side rail. (See photos 80-83)

D. Interior Wet Surfaces

ROOF STIFFENERS:

Number: 2

Size: 5 in. x 3 in. x 3/8 in., angle

INTERIOR WET CONTAINER LADDER:

Number of Rungs: 47
Width: 16 in.
Rung Size: 3/4 in. square
Rung Spacing: 12 in. on center
Side Rails: 2-1/2 in. x 3/8 in., flat bar
Toe Room: 11-1/4 in.
Brackets:
Construction: welded
Size: 3 in. x 3/8 in., flat bar
Spacing: approx. 7 ft
Safe-Climbing Device: 3/8 in. diameter cable-type

CATHODIC PROTECTION: none

OVERFLOW:

Inlet Type: open pipe equipped with an anti-vortex plate assembly
Location: approx. 5 ft 6 in. below the roof cap

INTERIOR WET COATING AND METAL CONDITION:

	Coating Thickness		% Failure to		Adhesion	Metal Loss	
	Range	Typical	Primer	Rust		Typical	Deepest
Roof	16 mils to 28 mils	22 mils	Neg.	< 1/2%	-	Neg.	Neg.

Key to Table

Adhesion 5 (very good)
4 (good)
3 (fair)
2 (poor)
1 (very poor)
0 (very poor)

T = Topcoat to Underlying Coating

S = Primer to Steel

Neg. = negligible

1. **Interior Wet Coating Condition**: Water and silt were observed on the bowl which restricted its evaluation. The white coating on the interior wet surfaces of the tank appeared to be in fair overall condition as corrosion and rust staining were observed on areas of the roof and stiffeners. Corrosion, rust tubercles, and rust staining were observed on areas of the bowl. The coating appeared to be an epoxy coating system.

2. **Roof Condition**: The roof was equipped with two stiffeners which were intermittently welded to the roof. The coating on the roof plates and stiffeners appeared to be in fair overall condition as corrosion and rust staining were observed on areas of the roof and stiffeners. Corrosion and rust staining were also observed on the roof around the access tube. Several lugs were located on the roof plates. **It is the opinion of Tank Industry Consultants that the lugs should not be used for rigging purposes**. (See photos 84-91)

3. **Shell Condition**: The coating on the interior shell appeared to be in good overall condition with no significant coating failure or corrosion observed. The shell coating was discolored due to mineral staining from the water. (See photo 90)

4. **Access Tube**: **There was an AWWA D100 deficiency noted: the access tube stiffeners below the top capacity level were not seal welded to the access tube.** The coating on the interior wet access tube surfaces appeared to be in fair overall condition with no significant coating failure or corrosion observed. A PVC pipe projected from the access tube. This pipe was detached from the PVC piping adjacent to the interior wet container ladder. The access tube was equipped with flat bar stiffeners which were intermittently welded to the access tube. (See photos 91-96)

5. **Interior Wet Container Ladder**: **There were safety and ANSI/OSHA deficiencies noted: (1) corrosion was observed on the interior wet container ladder safe-climbing device and its brackets which may not allow the device to function properly, (2) the conduit attached to the interior wet container ladder brackets could interfere with the climber's use of the side rail, and (3) the PVC piping extending behind the interior wet container ladder could interfere with the toe room behind the ladder**. A ladder provided access from the container roof manhole to the bowl. The ladder was equipped with a cable-type safe-climbing device, and corrosion was observed on the safe-climbing device and its brackets. The interior wet container ladder was welded to brackets that were welded to the access tube. Corrosion and metal loss were observed on the ladder rungs. Conduit was attached to the ladder brackets. PVC piping extended behind the ladder. Equipment attached to corroded chains was suspended inside the tank container. (See photos 97-102)

6. **Overflow Pipe**: The overflow pipe was equipped with an open pipe inlet equipped with an anti-vortex plate assembly. The location of the overflow inlet was such that the top capacity level was approximately 5 ft 6 in. below the roof cap. Corrosion was observed on the overflow inlet. (See photos 93-94)

7. **Bowl Condition**: Water and silt were observed on the bowl which restricted its evaluation. From the limited area observed during the field evaluation, the coating on the bowl appeared to be in fair overall condition as corrosion, rust tubercles, and rust staining were observed on areas of the bowl. (See photos 103-106)

RECOMMENDATIONS:

A. Foundation and Site

1. **Site Maintenance**: The site should be regraded so that the top of the foundation projects the AWWA recommended minimum of 6 in. above grade and so that proper drainage away from the foundation occurs. Site maintenance should be performed with the mower discharge directed away from the base of the tank to prevent rock chips in the coating and the accumulation of grass clippings on the base plate and lower base cone. The gate should continue to be locked at all times to deter unauthorized entry and limit liability for the Owner.

2. **Site Access and Restoration**: There was adequate space for a contractor to stage equipment on the site. The fence may need to be removed for tank rehabilitation operations. Provisions should be included in the specifications for the restoration of any surfaces and structures disturbed by the contractor's work.

3. **Tank and Site Security**: Water tanks have been defined by some courts under certain circumstances as attractive nuisances. As such, there may be a significant potential liability to the Owner for injury to persons on the tank and tank site, even if access is not authorized. Recent events have prompted the entire water industry to consider measures that inhibit intentional acts that could threaten the water supply. A review of the security requirements for the tank and site is recommended to confirm that the existing measures are consistent with the Owner's security requirements for their water system. Primary tank and site security should be focused on eliminating, preventing, and detecting unauthorized access to the tank. Such security measures might include routinely and periodically verifying all doors, manholes, and gates are locked. Other security measures might include installing no-trespassing signs, upgrading the existing site lighting, adding motion detectors on the site, installing alarms on the gate and tank manholes, and arranging frequent site visits by law enforcement agencies. The proper operation of the surveillance camera attached to the roof safety railing should be verified.

4. **Foundation**: When the tank exterior is repainted, any unsound concrete should be chipped to sound material and the concrete should be brush-off blasted. Any deteriorated areas or voids found should have a bonding agent and a vinyl emollient modified concrete patching mortar applied to build up the surface to its original contour. (This repair did not appear to be necessary at the time of this evaluation.) The concrete should then be painted with a concrete sealer.

5. **Grout Maintenance and Install Sealant**: All loose grout should be chipped away to solid material when the tank is empty. Any shim plates that can be removed should be taken out. Any voids in the grout should be filled with a nonshrinking, nonstaining, structural grout material. The grout should be placed as far back under the base plates as possible and squared off vertically with the edge of the base plates. (This repair did not appear to be necessary at the time of this evaluation.) Any remaining gap between the steel base plates and the grout should be filled with a flexible sealant.

6. **Overhead Power Lines:** All overhead power lines within 40 ft of the tank should be relocated underground in order to prevent potential electrical shock to personnel working on the tank. The relocation of the power lines should be performed in accordance with the National Electric Code (NEC) guidelines.

B. Exterior Surfaces

1. **Life of the Exterior Coating**: The exterior coating system appeared to be in good overall condition with only minor corrosion observed on isolated areas of the roof. Tank Industry Consultants believes that the exterior surfaces should not need to be painted within the next 5 to 7 years from a corrosion standpoint. However, the exterior surfaces should be reevaluated within the next 3 to 5 years, in accordance with AWWA recommendations, to determine a precise recoating schedule. Due to the good to very good adhesion of the existing exterior coating, spot cleaning and topcoating the existing system appears to be a viable option. The exterior coating system should be evaluated immediately prior to preparing specifications to determine if the coating adhesion is still adequate to accept a topcoat.

2. **Coating Testing**: Prior to preparation of specifications for the cleaning and coating of the exterior of the tank, samples of the exterior coating system should be subjected to laboratory analysis to test for ingredients which may at that time be subject to regulations concerning their handling and disposal.

3. **Cleaning**: When the exterior is to be cleaned, all varieties of containment should be investigated. Containment of the wind-blown debris and paint overspray will be required due to the proximity of the adjacent buildings, residences, churches, parking lot, and playground.

4. **Recommended Coating System**:

a. **Spot Clean and Topcoat**: If the exterior is to be repainted within the next few years, then spot cleaning and topcoating the tank appears to be the recommended option. The typical life of a spot cleaned and topcoated system is approximately 7 to 8 years, but is highly dependent on previous surface preparation and the condition of the underlying coating system.

b. **Coating Application**: The entire exterior surfaces of the tank should be high-pressure washed to remove chalked coating, mildew, and contaminants. After washing, the damaged and rusted areas should be spot cleaned to the equivalent of an SSPC-SP 6, Commercial Blast Cleaning, or SSPC-SP 11, Power Tool Cleaning to Bare Metal. All areas of excessive coating thickness and runs in the coating should be cleaned to the equivalent of an SSPC-SP 7, Brush-Off Blast Cleaning, to remove the excessive mils. The spot cleaned areas should receive a spot prime coat compatible with the present coating system. The entire exterior surfaces should then be intermediate coated and topcoated with a compatible coating system.

5. **Alternative Coating System**:

a. **Complete Cleaning and Repainting**: The most economical, long-life coating system presently available for this site is an epoxy-polyurethane coating system. Properly formulated and applied polyurethanes have good resistance to condensation, mildew, and chipping. The polyurethanes also have excellent color and gloss retention and the longest expected service life of any of the common exterior tank coatings. The typical life of a properly applied epoxy-polyurethane coating system is approximately 15 to 20 years. These coatings are also presently manufactured to meet current VOC requirements.

b. **Coating Application**: When the tank is to be repainted, the tank should be completely cleaned and repainted. The entire tank exterior should be cleaned to the equivalent of an SSPC-SP 6, Commercial Blast Cleaning and have an epoxy-primed, epoxy intermediate and polyurethane finish coating system applied. However, care must be taken during the application of this particular coating system because this coating does have poor dry-fall characteristics, and potential damage to the surrounding property must be taken into consideration. The polyurethane coatings also require close monitoring of temperature and humidity during application.

6. **Effective Service Life**: Tank Industry Consultants defines the life of a coating as the amount of time before repainting becomes necessary due to coating failure and corrosion. During the coating life the Owner should expect the coating to lose its gloss, start to chalk, show signs of weathering, and possibly some rust staining. Future touch-up may be required on isolated coating failures. If aesthetics are a concern, the Owner may have to topcoat the repainted tank prior to the end of the expected service life. However, future topcoating would be less expensive than complete cleaning and recoating and could delay the next complete cleaning and repainting for many years.

7. **Other Systems**: With air emission volatile organic compounds (VOC) restrictions being put in place around the nation, alternative coating systems may become available that would be viable options for this tank. The Owner should review the available systems prior to preparing specifications for the recoating project.

8. **Coating Curing**: It would be more economical to paint the tank exterior at the same time the interior wet is painted, since the tank should be drained while the exterior is painted, and the applied coatings cure. This will also reduce mobilization and observation costs.

9. **Rehabilitation Schedule**: To obtain the lowest possible prices for the work outlined in the recommendations, the Owner should have the specifications prepared and the work bid in the early fall, with the work scheduled to start in early winter.

10. **Grinding and Bracket Removal**: Any unused brackets or erection lugs should be removed prior to the exterior repainting. Any weld burrs, weld spatter, or erection scars should be ground off to provide a smooth surface for the application of the coating.

11. **Electrical Apparatus**: All unused electrical conduit, antennas, fixtures, and electrical metering equipment should be removed from the tank and tank site. All required equipment should be repaired in accordance with the National Electric Code (NEC). The uncovered conduit junction box and broken conduit exposing wiring near the bottom of the base cone should be repaired and covered, or removed.

12. **Anchor Bolts and Chairs**: After abrasive blast cleaning, the anchor bolts, chairs, and nuts should be examined for deterioration. If deterioration is found and the anchor bolts and nuts are mild steel, the deteriorated areas of the anchor bolts should be repair welded as necessary. It should be verified that the anchor bolt chairs are filled with grease to prevent corrosion within the chairs.

13. **Overflow Pipe**: Stub overflow pipes result in the potential for accelerated corrosion on the exterior support column and base cone surfaces as well as erosion of the soil due to effluent discharge. Therefore, Tank Industry Consultants and the 10 State Standards recommend extending the pipe to near grade. The overflow pipe should extend to approximately 24 in. above grade attached to the support column and base cone by welded steel brackets. If the overflow pipe is not extended to near grade, it should be modified to project minimum 12 in. from the support column in accordance with AWWA D100. The overflow pipe discharge should be equipped with a screened, counter-weighted flap gate or elastomeric check valve to prevent the ingress of birds, small animals and insects into the tank. The air break should be adequately sized to allow the proper functioning of the new flap gate if one is installed. The overflow effluent should be directed away from the foundation using a concrete splash block and rip rap.

14. **Painter's Ring**: The bent top painter's ring should be replaced. **It is the opinion of Tank Industry Consultants that the painter's rings should not be used for rigging purposes**.

15. **Roof Safety Railing**: The toe bar should be replaced with a new toe bar that is minimum 3-1/2 in. high. The gap between the new toe bar and the roof should be less than 1/4 in. in accordance with the OSHA requirements.

16. **Clog-Resistant Vent**: The tank was not equipped with a clog-resistant vent. AWWA Standards require that all tanks be equipped with vents designed to ensure "fail-safe" operation if the insect screens become occluded. Inadequate ventilation could cause a tank collapse if the tank is rapidly drained while the screen is occluded or frosted over. Therefore, the existing vent should be replaced with a clog-resistant vent. The vent should be designed so that it is removable in order to act as a second means of access to the tank interior. Until such time as the vent can be replaced, 24 x 24 mesh screening should be installed on the existing vent immediately.

17. **Existing Container Roof Manhole**: The existing container roof manhole cover should be modified such that it can close fully and its locking hasps align. The container roof manhole and cover should be locked to improve water system security.

18. **Threaded and Plugged Couplings in Roof**: The open coupling in the roof should be plugged and the broken plug on one of the couplings should be replaced to prevent the ingress of rain water run-off and insects into the tank.

19. **Obstruction Lights**: The Owner should file a FAA Form 7460 to verify the need for obstruction lighting on the tank. If the lighting is required, the proper operation of the obstruction lights and photoelectric cell should be verified. If the lighting is not required, the light assembly and all associated conduits and brackets should be removed.

C. Interior Dry Surfaces

1. **Life of the Interior Dry Coating**: The coating on the interior dry surfaces of the tank appeared to be in fair to good overall condition as corrosion was observed on areas of the condensate platform and top platform. Tank Industry Consultants recommends that the interior dry surfaces should be painted within the next 3 to 4 years. The concrete floor of the base cone was severely damaged. Therefore, the concrete floor should be repaired or replaced as soon as possible. Due to the fair to good adhesion of the existing interior dry coating, spot cleaning and spot coating the existing system appears to be a viable option. The interior dry coating system should be evaluated immediately prior to preparing specifications to determine if the coating adhesion is still adequate to accept a spot coat.

2. **Coating Testing**: Prior to preparation of specifications for the cleaning and coating of the interior dry portions of the tank, samples of the coating system should be subjected to laboratory analysis to test for ingredients which may at that time be subject to regulations concerning their handling and disposal.

3. **Recommended Coating System**:

a. **Spot Clean and Spot Coat**: The condition of the interior dry surfaces may allow spot cleaning and spot coating. The typical life of a spot cleaned and topcoated system is approximately 8 to 10 years, but is highly dependent on previous surface preparation and the condition of the underlying coating system.

b. **Coating Application**: If the interior dry surfaces are to be spot cleaned and spot coated, the entire interior dry surfaces of the tank should be high-pressure washed to remove mildew and contaminants. After washing, the damaged and rusted areas should be spot cleaned to the equivalent of an SSPC-SP 6, Commercial Blast Cleaning, or SSPC-SP 11, Power Tool

Cleaning to Bare Metal. All areas of excessive coating thickness and runs in the coating should be cleaned to the equivalent of an SSPC-SP 7, Brush-Off Blast Cleaning, to remove the excessive mils. The spot cleaned areas should receive a spot prime coat compatible with the present coating system. The spot primed areas should then be spot coated with a finish coat compatible with the present coating system.

4. **Alternate Coating System**: If the Owner wishes, the interior dry surfaces could be completely cleaned to the equivalent of an SSPC-SP 6, Commercial Blast Cleaning and have a two-coat epoxy coating system applied. The typical life of a properly formulated and applied epoxy coating system is approximately 15 to 20 years or more in a dry environment. These coatings are also presently manufactured to meet current VOC requirements.

5. **Recommended Dry Bowl and Access Tube Coating System**: The dry bowl and access tube surfaces should be cleaned to the equivalent of an SSPC-SP 10, Near-White Blast Cleaning and have a two-coat epoxy system applied. The typical life of a properly formulated and applied epoxy coating system is approximately 15 to 20 years or more in a dry environment. These coatings are also presently manufactured to meet current VOC requirements.

6. **Replace Concrete Floor of Base Cone**: Approximately half of the concrete floor of the base cone was severely damaged. The areas of disturbed fill below the damaged concrete floor should be backfilled and compacted in accordance with the specifications of a Professional Geotechnical Engineer. The concrete floor should then be replaced. These repairs should be performed as soon as possible.

7. **Electrical Apparatus**: All unused electrical conduit, fixtures, and electrical metering equipment should be removed from the tank and tank site. All required equipment should be repaired in accordance with the National Electric Code (NEC). The uncovered cabinet and broken cables or conduits exposing wiring inside the base cone should be repaired and covered. After the concrete floor of the base cone is repaired, the cables and conduits should be relocated such that they do not create a trip hazard.

8. **Grinding and Bracket Removal**: Any unused brackets or erection lugs should be removed prior to the interior dry repainting. Any weld burrs, weld spatter, or erection scars should be ground off to provide a smooth surface for the application of the coating.

9. **Interior Dry Ladders**: The support column ladder sections should be replaced with a single ladder with continuous side rails. The interior dry base cone and support column ladders should be modified to provide minimum 30 in. head clearance in accordance with the current OSHA requirements. At the time of the interior dry repainting, the safe-climbing devices should be protected from the application of the coating. The electrical conduits and cables should be relocated away from the side rails.

10. **Interior Dry Lighting**: No light fixtures were observed in the interior dry areas of the tank. The Owner should consider installing light fixtures equipped with globes and protective cages inside the interior dry areas of the tank. The new lighting fixtures installed in the interior dry areas of the tank should be regularly maintained.

11. **Pipe Pit**: The access rungs could be replaced with a ladder that meets current OSHA requirements. The piping and valves located in the pipe pit should be cleaned and painted in accordance with the interior wet coating recommendations at the time of the tank cleaning and coating. The concrete surfaces should be cleaned to the equivalent of a brush-off blast cleaning and painted with a concrete sealer. The pipe pit access could be covered and locked at all times in order to limit liability to the Owner and to protect water system security.

12. **Pressure Gage**: It should be verified if the tank is equipped with a ground level TCEQ compliant pressure gage.

13. **Top Platform**: At the time of the interior dry recoating, the top platform should be flooded and additional drain holes installed in the areas of ponding water on the platform floor.

14. **Hand Hold**: **The hand hold above the painter's manhole should not be used for rigging purposes.**

15. **Access Tube Ventilation Manhole**: The access tube ventilation manhole cover should be equipped with a hinged support on the interior dry side of the access tube.

D. Interior Wet Surfaces

Preface to Interior Wet Recommendations: The interior wet surfaces below the shell could not be completely evaluated due to the Owner not being able to completely drain the tank. Therefore, the following recommendations are based on the condition of the surfaces above the bowl. Prior to the preparation of specifications for interior rehabilitation work, the tank should be drained, washed out and thoroughly evaluated to more accurately determine the scope of work required. The interior surfaces could be evaluated by an experienced diver if Owner requirements preclude draining of the tank. A complete evaluation of the interior would also reduce the number of potential change orders, and reduce the overall amount of the bids by eliminating uncertainty about the condition of the coating and steel.

1. **Life of the Interior Wet Coating**: The interior wet coating system appeared to be in fair overall condition as corrosion and rust staining were observed on areas of the roof and stiffeners. Corrosion, rust tubercles, and rust staining were observed on areas of the bowl. Tank Industry Consultants recommends that the interior wet surfaces of this tank should be recoated in 3 to 4 years. It is recommended that when the interior is completely cleaned and repainted, an epoxy coating system should be used.

2. **Coating Testing**: Prior to preparation of specifications for the cleaning and coating of the interior wet of the tank, samples of the interior wet coating system should be subjected to laboratory analysis to test for ingredients that may at that time be subject to regulations concerning their handling and disposal.

3. **Recommended Interior Coating System**:

   a. **Epoxy Coating System**: The optimum long-life coating system presently available for the interior of water tanks is a two-component epoxy coating system. A three-coat epoxy system is recommended for the interior of this tank. This coating system should meet the certification criteria of ANSI/NSF 61 and state department of health regulations.

b. **Coating Application**: When the interior is to be repainted, the entire tank interior should be cleaned to the equivalent of an SSPC-SP 10, Near-White Blast Cleaning and an epoxy coating system applied.

c. **Service Life**: The typical life of a properly formulated and applied epoxy coating system is approximately 12 to 15 years in immersion service. Tank Industry Consultants defines the life of a coating as the expected service life before repainting becomes necessary due to coating failure and corrosion. The Owner could extend the service life of the coating by installing, properly maintaining and operating a cathodic protection system to help protect the steel surfaces in areas that have experienced coating failure.

4. **Install Cathodic Protection System**: When the tank is rehabilitated the brackets and fittings should be installed for the future installation of a cathodic protection system.

a. **Type**: When the cathodic protection system is installed, an ice-resistant cathodic protection system that features long-life anodes, automatic potential and current control should be specified.

b. **Scheduling**: After the interior is completely cleaned and recoated, the cathodic protection system should not be energized until after the First Anniversary Evaluation. The Owner should conduct washouts and evaluations approximately every 3 years to monitor the need for cathodic protection. As the interior coating begins to show signs of failure, the cathodic protection system should be energized to aid in minimizing corrosion below the top capacity level.

c. **Maintenance**: Cathodic protection, if used and maintained properly, will control active corrosion below the water level and extend the useful life of a coating system. It should be noted that maintenance as recommended by the cathodic protection manufacturer is required for the cathodic protection system to work properly. Without proper monitoring, the cathodic protection system may operate too high and cause the coating to blister, or the system may operate too low and not adequately protect the exposed steel surfaces.

5. **Pit Welding and Pit Filling**: After initial cleaning, all significant pitting that is found should be welded, and all pitting with rough edges that would make the pitting difficult to coat properly should be filled with a solventless epoxy seam sealer.

6. **Seam Sealing**: The existing roof manhole intersections, existing roof vent intersections, and roof stiffener-to-roof plate intermittent weld seams should be sealed with an epoxy seam sealer at the time of the interior recoating.

7. **Roof Plate Lap Seams**: A flexible sealant should be applied along the roof plate lap seams.

8. **Rough Edges**: All unused brackets should be removed from the interior and exterior surfaces at the time of the next recoating. Any weld burrs, spatter, scars or rough edges in the steel should be ground smooth to provide a better surface for coating.

9. **Access Tube Stiffeners**: The access tube stiffeners below the top capacity level should be seal welded to the access tube in accordance with the AWWA D100 requirements.

10. **Interior Wet Container Ladder**: Interior wet container ladders may be susceptible to accelerated rates of corrosion. If the Owner desires an interior ladder, the existing safe-climbing device should be replaced with a new corrosion-resistant safe-climbing device that is of the same size and style as the other safe-climbing devices on the tank. The conduit attached to the ladder brackets and PVC piping adjacent to the ladder should be relocated away from the ladder to provide adequate clearance in accordance with the OSHA requirements. The detached PVC piping should be reconnected if in use.

11. **Equipment in Tank**: The corroded chains of the equipment suspended inside the tank container should be replaced, or the equipment removed if not in use.

ECONOMIC FACTORS:

Item	Cost	Life in Years
Replacement of tank with a new one	$1,500,000[1]	75+

The following is a complete list of repairs and estimated costs for their respective recommendations found in the RECOMMENDATION section of this report.

Item	Sanitary & Safety	Scheduled Maintenance Repairs
Clean and Paint Exterior:		
Spot Repair and Topcoat		$125,000
Containment		180,000
SP 6, Complete Clean, Epoxy/Polyurethane System		200,000
Containment		200,000
Clean and Paint Interior Dry:		
Spot Repair and Spot Coat		8,000
SP 6, Complete Clean, Epoxy/Polyurethane System		30,000
Clean and Paint Interior Wet:		
SP 10, 3-Coat Epoxy System		140,000
Replace Concrete Floor of Base Cone		90,000
Install Cathodic Protection System		15,000
Miscellaneous Chipping and Grinding		3,000
Seam Sealing		5,000
Pit Repair		2,000
Install Foundation Sealant		2,000
Foundation Repair		3,000
Extend Overflow Pipe to Near Grade	$15,000	
Install Overflow Pipe Elastomeric Check Valve & Concrete Splash Pad	7,000	
Replace Pipe Pit Access Rungs with Ladder	2,000	
Repair or Replace Uncovered Cabinet, Broken Conduits & Uncovered Conduit Junction Boxes	5,000	
Install Interior Dry Light Fixtures	2,000	
Replace Interior Dry Support Column Ladder	8,000	
Modify Interior Dry Ladders	6,000	
Install Additional Drain Holes in Condensate Platform & Top Platform	4,000	
Install Hinged Support on Interior Dry Side of Access Tube Ventilation Manhole	2,000	
Replace Broken & Missing Plugs of Threaded and Plugged Couplings in Roof	500	
Replace & Lower Roof Safety Railing Toe Bar	2,000	
Modify or Replace Container Roof Manhole Cover	2,000	
Install Clog-Resistant Vent	8,000	
Install Existing Vent Screening	1,000	
Seal Weld Access Tube Stiffeners	8,000	
Remove Interior Wet Container Ladder	2,000	
Replace Interior Wet Container Ladder Safe-Climbing Device	2,000	
Replace Corroded Chains of Equipment in Container	500	
Contingency Items	12,000	25,000

Estimates are believed to be a high average of bids that would be received in 2023.

[1] The replacement estimate includes costs associated with new tank fabrication and erection, foundation, painting, and engineering. The budget estimate given does not include costs associated with tank demolition, site acquisition, and distribution interruptions.

The following economic factors include only those work items that the Engineer believes to be the minimum to properly maintain this tank from an operational standpoint and address the listed safety and sanitary deficiencies. Other items related to safety and risk management should be evaluated by the Owner.

Item	Cost
Clean and Paint Exterior:	
Spot Repair and Topcoat	$125,000
Containment	180,000
Clean and Paint Interior Dry:	
Spot Repair and Spot Coat	8,000
Clean and Paint Interior Wet:	
SP 10, 3-Coat Epoxy System	140,000
Replace Concrete Floor of Base Cone	90,000
Install Cathodic Protection System	15,000
Miscellaneous Chipping and Grinding	3,000
Seam Sealing	5,000
Pit Repair	2,000
Install Foundation Sealant	2,000
Foundation Repair	3,000
Extend Overflow Pipe to Near Grade	15,000
Install Overflow Pipe Elastomeric Check Valve & Concrete Splash Pad	7,000
Replace Pipe Pit Access Rungs with Ladder	2,000
Repair or Replace Uncovered Cabinet, Broken Conduits & Uncovered Conduit Junction Boxes	5,000
Install Interior Dry Light Fixtures	2,000
Replace Interior Dry Support Column Ladder	8,000
Modify Interior Dry Ladders	6,000
Install Additional Drain Holes in Condensate Platform & Top Platform	4,000
Install Hinged Support on Interior Dry Side of Access Tube Ventilation Manhole	2,000
Replace Broken & Missing Plugs of Threaded and Plugged Couplings in Roof	500
Replace & Lower Roof Safety Railing Toe Bar	2,000
Modify or Replace Container Roof Manhole Cover	2,000
Install Clog-Resistant Vent	8,000
Install Existing Vent Screening	1,000
Seal Weld Access Tube Stiffeners	8,000
Replace Interior Wet Container Ladder Safe-Climbing Device	2,000
Replace Corroded Chains of Equipment in Container	500
Contingency Items	30,000
Total of Engineer's Recommendations	**$678,000**

Tank Industry Consultants has no control over the cost of labor, materials, or equipment, or over the contractors' methods of determining prices, or over competitive bidding, or the market conditions. Opinions of probable cost, as provided for herein, are to be made on the basis of our experience and qualifications and represent our best judgment as design professionals familiar with the design, maintenance, and construction of concrete and steel plate structures. However, Tank Industry Consultants cannot and does not guarantee that proposals, bids, or the construction cost will not vary from opinions of probable cost prepared for the Owner.

Due to the numerous potential scopes of work that exist, the Owner should obtain an updated budget estimate once the final scope of work has been determined. This would enable the Owner to accurately budget monies for additional mobilization costs and damaged coating rehabilitation costs.

Engineering and resident observation costs are not included in the Total of the Engineer's Recommendations because these fees are dependent upon the scope of work to be performed. Tank Industry Consultants performs all facets of the engineering services that would be required for this project. Estimated fees for engineering and resident observation will be furnished upon request.

CLOSURE:

Brief Summation: The City of Deer Park owns and operates a 250,000 gallon single-pedestal spheroid water storage tank in Deer Park, Texas. The exterior coating system appeared to be in good overall condition with only minor corrosion observed on isolated areas of the roof. Tank Industry Consultants believes that the exterior surfaces should not need to be painted within the next 5 to 7 years from a corrosion standpoint. The coating on the interior dry surfaces of the tank appeared to be in fair to good overall condition as corrosion was observed on areas of the condensate platform and top platform. The interior wet coating system appeared to be in fair overall condition as corrosion and rust staining were observed on areas of the roof and stiffeners. Corrosion, rust tubercles, and rust staining were observed on areas of the bowl. Tank Industry Consultants recommends that the interior dry and interior wet surfaces of this tank should be recoated within the next 3 to 4 years. The concrete floor of the base cone was severely damaged. Therefore, the concrete floor should be repaired or replaced as soon as possible. Proper maintenance after completing the recommendations herein would include periodic washouts and evaluations approximately every 3 to 5 years in accordance with AWWA recommendations, annual TCEQ and the installation and proper maintenance of a new cathodic protection system with long-life anodes.

Contractor Selection: The work should be performed by a competent bonded contractor, chosen from competitive bids taken on complete and concise specifications. The coatings used should be furnished by an experienced water tank coating manufacturer, supplying the field service required for application of technical coatings.

Standards for Repairs and Coatings: All work and coatings applied should be in accordance with ANSI/NSF Standard 61, the coating manufacturer's recommendation, TCEQ, AWWA D100, AWWA D102, AWWA D104/106, and specified standards of AMPP, The Association for Materials Protection and Performance (formerly SSPC: The Society for Protective Coatings and NACE International, National Association of Corrosion Engineers).

Observation of Work: Observation of the work in progress by experienced personnel will offer additional assurance of quality protective coating application. Observations can be performed on a continuous basis or spot (critical phase) basis. The actual cost of observation may be less using spot as opposed to full-time resident observation; however, with spot observation it is often necessary for work to be redone to comply with the specifications. This somewhat lowers the quality of the finished product, lengthens the job, and is frequently a cause of conflict between the contractor, Owner, and field technician. Resident full-time observation minimizes the amount of "rework" required.

Anniversary and Maintenance Evaluations: An anniversary evaluation should be conducted prior to the end of the one-year bonded guarantee after rehabilitation work has been completed. Washouts and coating, structural, sanitary, safety, and corrosion evaluations should be conducted not less than every 3 to 5 years.

Time Frame: If the work is not performed within the next 6 months, the structure should be reevaluated prior to the preparation of specifications and solicitation of bids.

Specifications and Bidding Documents: The recommendations in this report are not intended to be specifications on which a contractor can bid. Complete bidding documents must include general and special conditions, detailed technical specifications, and other information necessary for the competitive bidding process. To properly protect the interests of the Owner, Contractor, and Engineer; the initial evaluation, the technical specifications, legal portions of the contract documents, and the observation should be performed by the same firm or with close coordination of all parties involved.

Limitations of Evaluation: It is believed that the conditions reported herein reflect the condition of the tank as observed on the date of the evaluation, using reasonable care in making the observations, and safety in gaining access to the tank. Should latent defects be discovered during the cleaning of the structure, they should be brought to the attention of the Owner and the Engineer.

Seismic and High Wind Loadings: This tank is located in or near a region of very low seismic activity. This evaluation and the reporting of the condition of this tank do not warrant the structural condition of the tank or any of the original design for seismic loadings. Likewise, recommendations for this tank do not include modifications that may be required for compliance with present structural codes. It is possible the tank was erected in compliance with pre-existing industry standards that have since been replaced by more restrictive standards.

Hazardous Materials in Coatings: It should be taken into consideration that Federal, State, and local environmental agencies have placed stricter controls on the removal of lead-based and other heavy-metal based coatings from steel structures by the use of conventional abrasive blasting techniques. The paint and blast residue may be considered to be hazardous waste depending on the concentration of lead or other particles in residue.

Please contact Tank Industry Consultants if you have any questions or comments.

Respectfully submitted,

Tank Industry Consultants

Aman Anand
Project Engineer

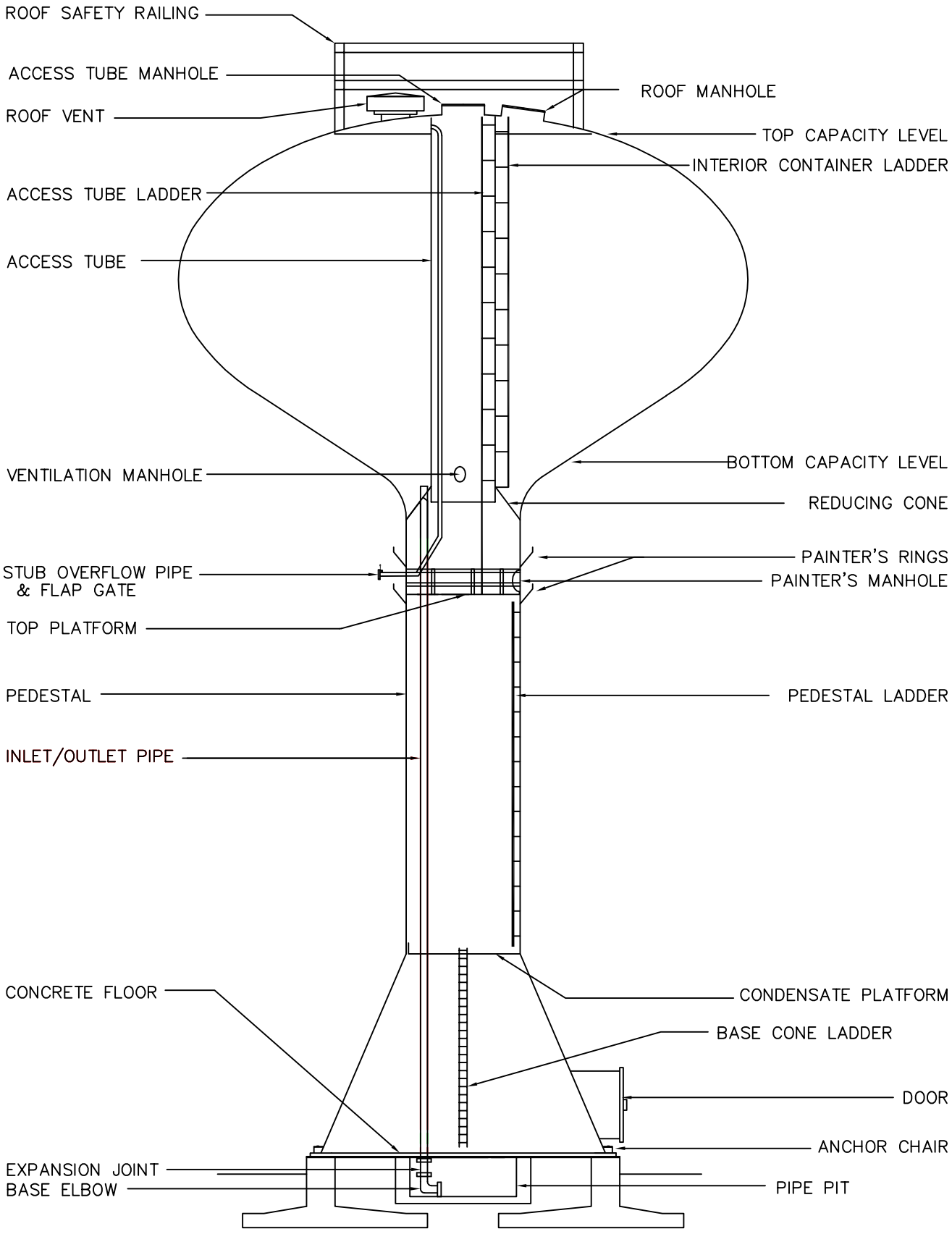
Gregory R. "Chris" Troy, P.E.
Managing Principal

STATE OF TEXAS
GREGORY TROY STEIN
79470
LICENSED
PROFESSIONAL ENGINEER

Tank Industry Consultants
Registration Number F-2891

SINGLE PEDESTAL SPHEROID TANK

NOMENCLATURE



Classification of Adhesion Test Results

Method A – X Cut Tape Test Approx. 1.5 in. long cuts at 30 deg. to 45 deg. apart.	Surface	Classification
No peeling or removal.		5
Trace peeling or removal along incisions.		4
Jagged removal along incisions up to 1/16 in. (1.6mm) on either side.		3
Jagged removal along most of incisions up to 1/8 in. (3.2mm) on either side.		2
Removal from most of the area of the X under the tape.		1
Removal beyond the area of the X.		0

Method B – Lattice Cut Tape Test Six parallel cuts at 2mm apart.	Surface	Classification
The edges of the cuts are completely smooth; none of the squares of the lattice are detached.	No Failure	5
Small flakes of the coating are detached at intersections; less than 5% of the lattice is affected.		4
Small flakes of the coating are detached along edges and at intersections of cuts. The area affected is 5% to 15% of the lattice.		3
The coating has flaked along the edges and on parts of the squares. The area affected is 15% to 35% of the lattice.		2
The coating has flaked along the edges of cuts in large ribbons and whole squares have detached. The area affected is 35% to 65% of the lattice.		1
Flaking and detachment worse than grade 1.		0

ASTM 3359 Standard Test Methods for Measuring Adhesion by Tape Test

Tank Industry Consultants

7740 West New York Street
Indianapolis, Indiana 46214

Telephone – 317/271–3100
FAX – 317/271–3300

- CERTIFICATE OF ANALYSIS -

Disp. Code: $ B E

Report Date: *02-Aug-23 11:07 AM*

Client ID: TANK_INDUST

Tank Industry Consultants
7740 West New York Street
Indianapolis, Indiana 46214

Phone: (317) 271-3100
Attn: Bruce Hobbs
FAX: (317) 271-3300

Our Lab # 23013834-001
Your Sample ID: Ext.
Sample Composition: Grab

Your Project # 23116.S1859.001
Collection Date: 07/25/23
Your Project Name: **Paint Samples**
Collected By: Client
Sample Type: Paint Chips
Receipt Date: 07/31/23 15:00

Total Metals, ICP-AES

Analytical Method	Prep Method	Prep Date	By
SW846 6010C	SW846 3050B	8/1/2023	swaldron

Parameter	Result	Units	Qual	Quant. Limit	CAS #	Analysis Date	By
Cadmium, Cd	< 25.0	mg/kg		25.0	7440-43-9	08/01/23 17:15	swaldron
Chromium, Cr	< 250	mg/kg		250	7440-47-3	08/01/23 17:15	swaldron
Lead, Pb	< 250	mg/kg		250	7439-92-1	08/01/23 17:15	swaldron

Our Lab # 23013834-002
Your Sample ID: Int. Wet
Sample Composition: Grab

Your Project # 23116.S1859.001
Collection Date: 07/25/23
Your Project Name: **Paint Samples**
Collected By: Client
Sample Type: Paint Chips
Receipt Date: 07/31/23 15:00

Total Metals, ICP-AES

Analytical Method	Prep Method	Prep Date	By
SW846 6010C	SW846 3050B	8/1/2023	swaldron

Parameter	Result	Units	Qual	Quant. Limit	CAS #	Analysis Date	By
Cadmium, Cd	< 25.0	mg/kg		25.0	7440-43-9	08/01/23 17:15	swaldron
Chromium, Cr	< 250	mg/kg		250	7440-47-3	08/01/23 17:15	swaldron
Lead, Pb	< 250	mg/kg		250	7439-92-1	08/01/23 17:15	swaldron

ESG Laboratories
5940 WEST RAYMOND STREET
INDIANAPOLIS, INDIANA 46241

PHONE (317) 290-1471
FAX (317) 290-1670
www.ESGLaboratories.com

Our Lab #	23013834-003	**Your Sample ID:**	Int. Dry
		Sample Composition:	Grab
Your Project #	23116.S1859.001	**Collection Date:**	07/25/23
Your Project Name:	**Paint Samples**	**Collected By:**	Client
Sample Type:	Paint Chips	**Receipt Date:**	07/31/23 15:00

Total Metals, ICP-AES

Analytical Method	Prep Method	Prep Date	By
SW846 6010C	SW846 3050B	8/1/2023	swaldron

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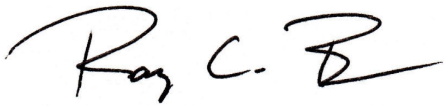
Lead, Pb	< 250	mg/kg		250	7439-92-1	08/01/23 17:15	swaldron



8/2/2023

Lab Manager **Date**

ESG Laboratories
5940 WEST RAYMOND STREET
INDIANAPOLIS, INDIANA 46241

PHONE (317) 290-1471
FAX (317) 290-1670
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1. Tank and site.

2. Tank and site.

3. Surrounding area.

4. Surrounding area.

5. Site gate. Note information and warning signs on the fence.

6. Piping and building on site.

7. Conduits and piping extending from below grade and penetrating the foundation and pipe projecting from near the bottom of the base cone.

8. Foundation, grout, and base plate.

9. Buried foundation, grout, base plate, and anchor bolt chair.

10. Foundation, grout, base plate, anchor bolt, and chair.

11. Uncovered conduit junction box and broken conduit exposing wiring.

12. Base cone exterior.

13. Base cone exterior and information and warning signs on the access door.

14. Base cone access door.

15. Mildew on the base cone exterior.

16. Base cone and support column exterior.

17. Support column, painter's manhole, and painter's rings.

18. Painter's manhole and painter's rings near the top of the support column. Note bent painter's ring.

19. Painter’s manhole.

20. Stub overflow pipe discharge equipped with a flap gate near the top of the support column.

21. Corrosion on the interior of the overflow pipe discharge.

22. Mildew on the bowl exterior.

23. Bowl exterior.

24. Mildew on the bowl exterior and signs on the shell exterior.

25. Mildew on the bowl exterior and signs on the shell exterior.

26. Sign on the shell exterior.

27. Sign on the shell exterior.

28. Threaded and plugged coupling in the roof exterior.

29. Irregular roof contour. Note threaded and plugged couplings in the roof.

30. Roof exterior. Note corrosion on open coupling in the roof.

31. Corrosion on open coupling in the roof.

32. Broken plug of threaded and plugged coupling in the roof.

33. Pitting which had occurred prior to the last repainting around threaded and plugged coupling in the roof.

34. Antennas attached to the roof safety railing.

35. Surveillance camera attached to the roof safety railing.

36. Roof safety railing, access tube roof manhole, and roof obstruction lights. Note cables extending through the manhole curb.

37. Access tube roof manhole. Note cables extending through the manhole curb.

38. Coating failure around the access tube roof manhole curb.

39. Pitting which had occurred prior to the last repainting on the access tube roof manhole curb.

40. Obstruction lights and photoelectric cell attached to the access tube roof manhole flange.

41. Misaligned container roof manhole locking hasps.

42. Corrosion on the container roof manhole curb and previously touched-up area on the cover interior.

43. Corrosion and metal loss on chain penetrating the container roof manhole curb.

44. Roof vent.

45. Gasket and corroded bolts and nuts on the roof vent flange.

46. Roof vent missing screening.

47. Conduits and cabinets exposing wiring at the severely damaged base cone floor.

48. Severely damaged base cone floor.

49. Exposed piping at the severely damaged base cone floor.

50. Exposed piping below the severely damaged base cone floor.

51. Debris and exposed conduits at severely damaged base cone floor.

52. Uncovered electrical cabinet exposing wiring above severely damaged base cone floor.

53. Electrical cabinet and broken conduits exposing wiring above severely damaged base cone floor.

54. Conduits above severely damaged base cone floor.

55. Inlet/outlet pipe extending from pipe pit in the base cone floor.

56. Access rungs and piping in the pipe pit.

57. Piping in the pipe pit.

58. Inlet/outlet pipe extending from the pipe pit.

59. Inlet/outlet pipe and brackets.

60. Inlet/outlet pipe extending from pipe pit.

61. Inlet/outlet pipe extending up the base cone and through the condensate platform.

62. Base cone ladder, safe-climbing device, and brackets.

63. Base cone ladder, safe-climbing device, and cables.

64. Spots of corrosion on the condensate ceiling drain pipe.

65. Condensate platform manhole.

66. Inlet/outlet pipe extending up the support column.

67. Inlet/outlet pipe U-bolted to bracket attached to the support column stiffener.

68. Support column ladder, safe-climbing device, and cables.

69. Support column ladder, safe-climbing device, and cables.

70. Support column ladder, safe-climbing device, cables, inlet/outlet pipe, and top platform.

71. Top platform manhole.

72. Overflow pipe penetrating near the top of the support column.

73. Overflow pipe bracket welded to the interior dry access tube.

74. Painter's manhole, retaining chain, and hand hold.

75. Inlet/outlet pipe penetrating the dry bowl.

76. Dry bowl.

77. Access tube ventilation manhole.

78. Touched-up area around pipe equipped with a valve penetrating the access tube.

79. Interior dry access tube.

80. Interior dry access tube ladder, safe-climbing device, cables, and overflow pipe.

81. Cables attached to the interior dry access tube ladder brackets and side rail.

82. Interior dry access tube ladder and safe-climbing device.

83. Overflow pipe penetrating near the top of the access tube, interior dry access tube ladder, and safe-climbing device.

84. Corrosion and rust staining on areas of the roof interior and stiffeners.

85. Corrosion on interior roof stiffener.

86. Corrosion and rusts staining on areas of the roof interior and stiffener. Note lug on the roof.

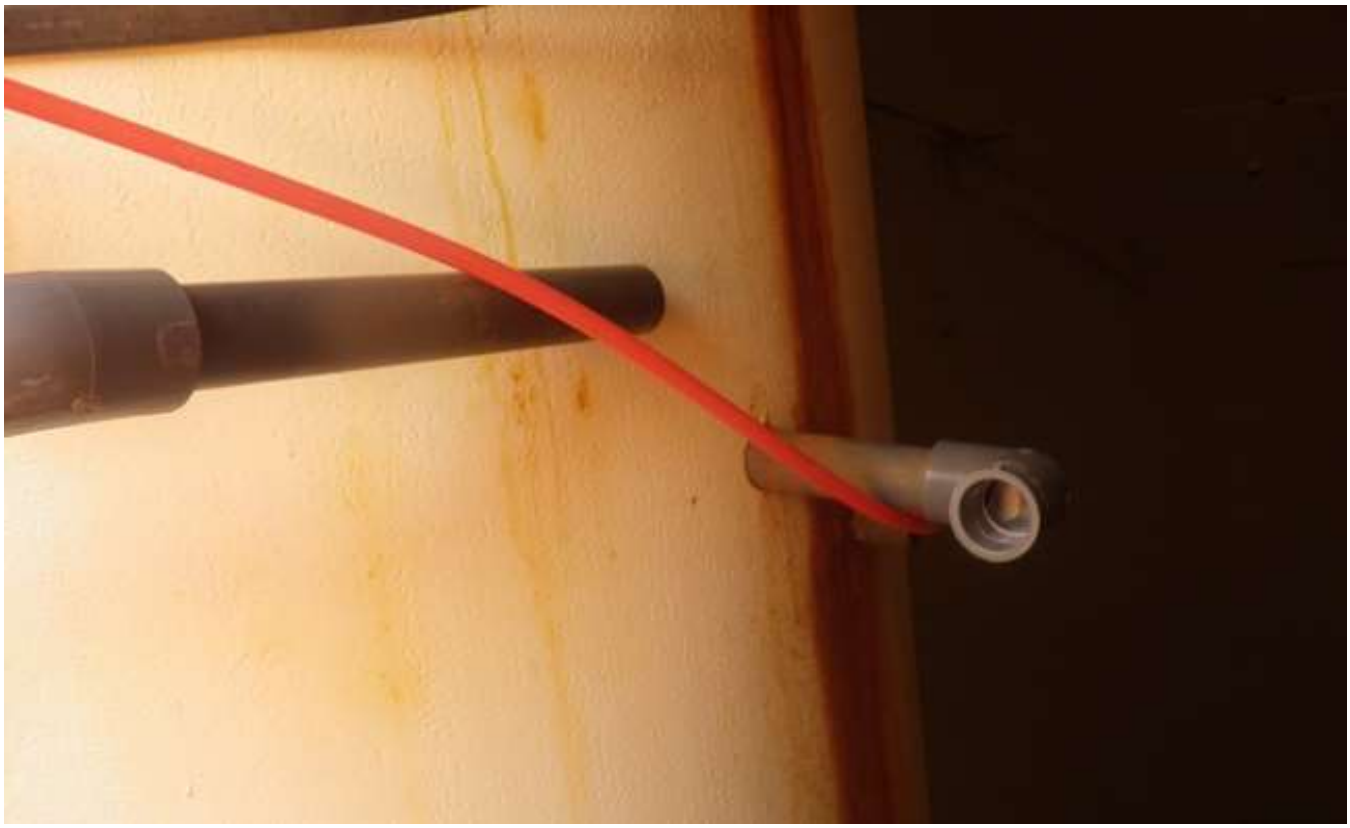
87. Corrosion and rust staining on areas of the roof interior and stiffener.

88. Minor corrosion and rust staining on areas of the roof interior.

89. Roof and shell interior.

90. Roof and shell interior.

91. Corrosion and rust staining on the roof interior around the access tube.



92. Pipe projecting from the access tube. Note detached pipe.

93. Corrosion on overflow inlet anti-vortex plate.

94. Corrosion on overflow inlet anti-vortex plate.

95. Interior wet access tube and bowl. Note water and silt on the bowl.

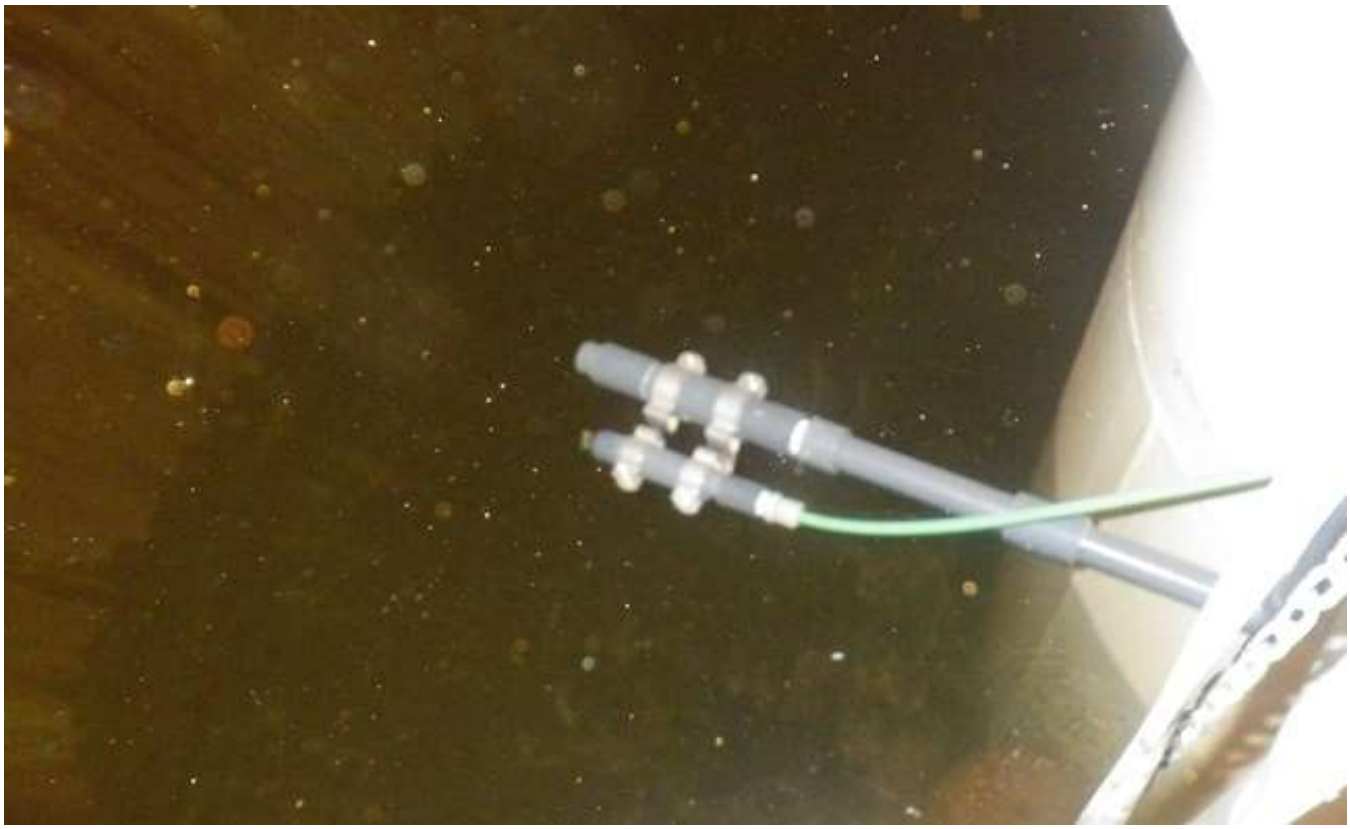
96. Interior wet access tube stiffener.

97. Interior wet container ladder rungs, safe-climbing device, and chains. Note corrosion on areas of the ladder rungs and on the chains.

98. Corrosion and metal loss on the interior wet container ladder safe-climbing device bracket.

99. Corrosion on the interior wet container ladder safe-climbing device.

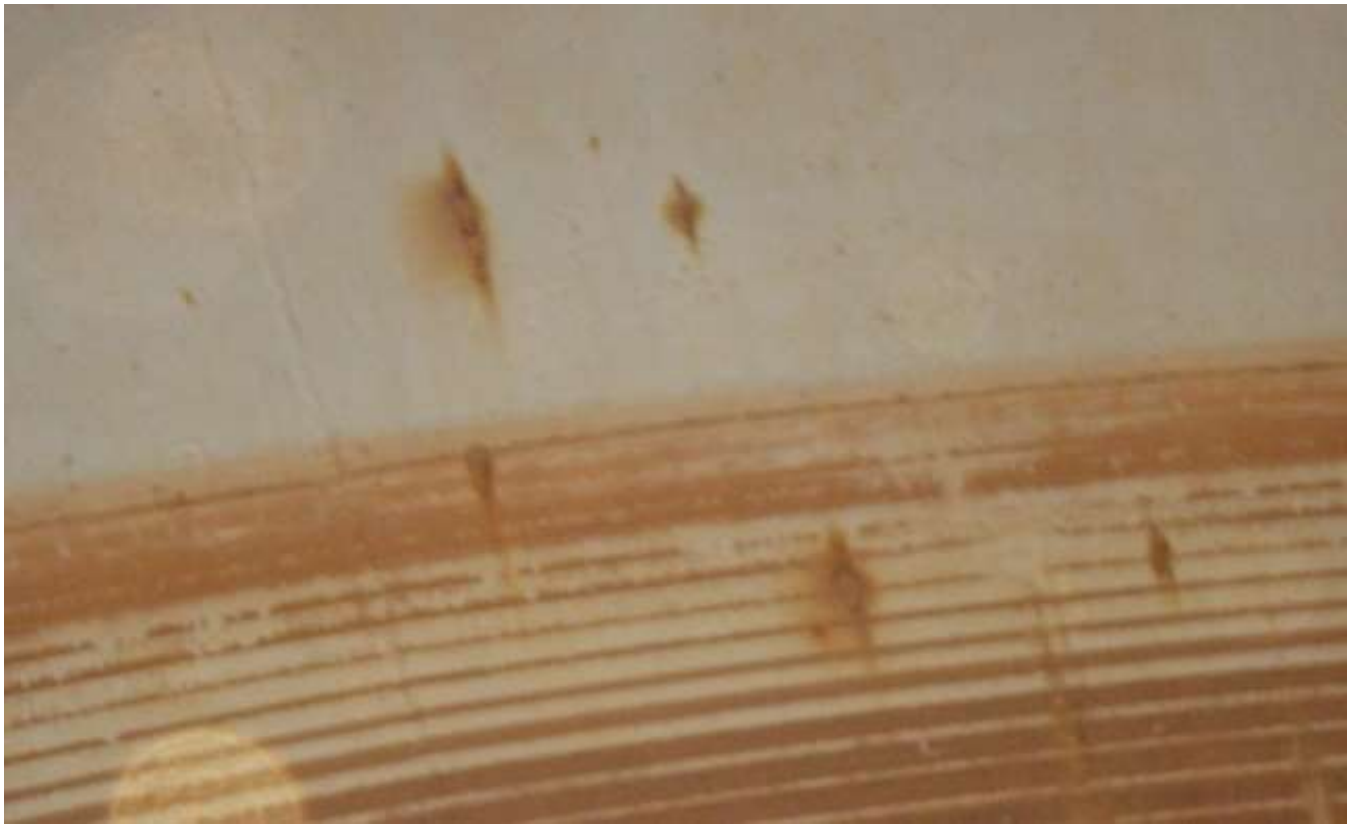
100. Conduit attached to the interior wet container ladder bracket.



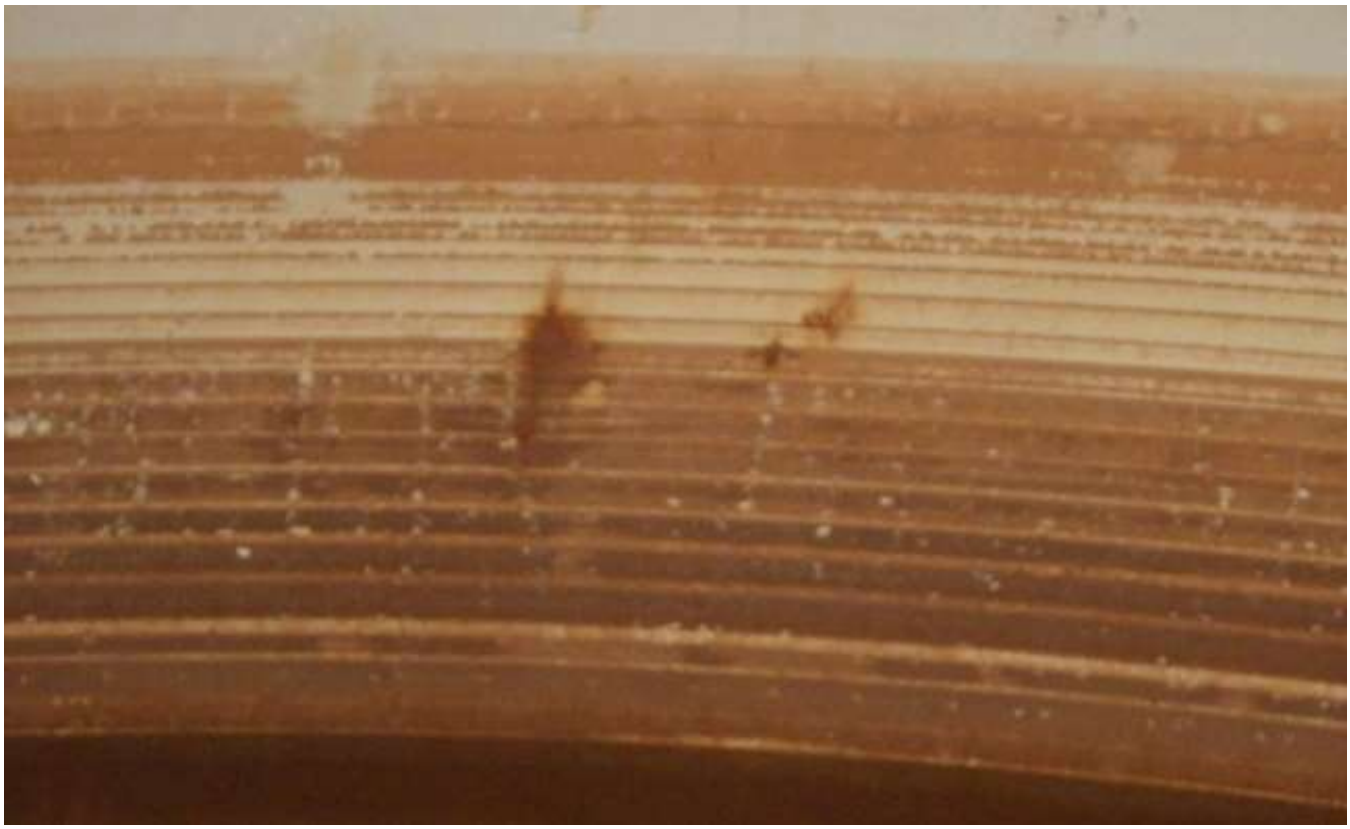
101. Equipment piping adjacent to the interior wet container ladder.

102. Equipment suspended inside the container.

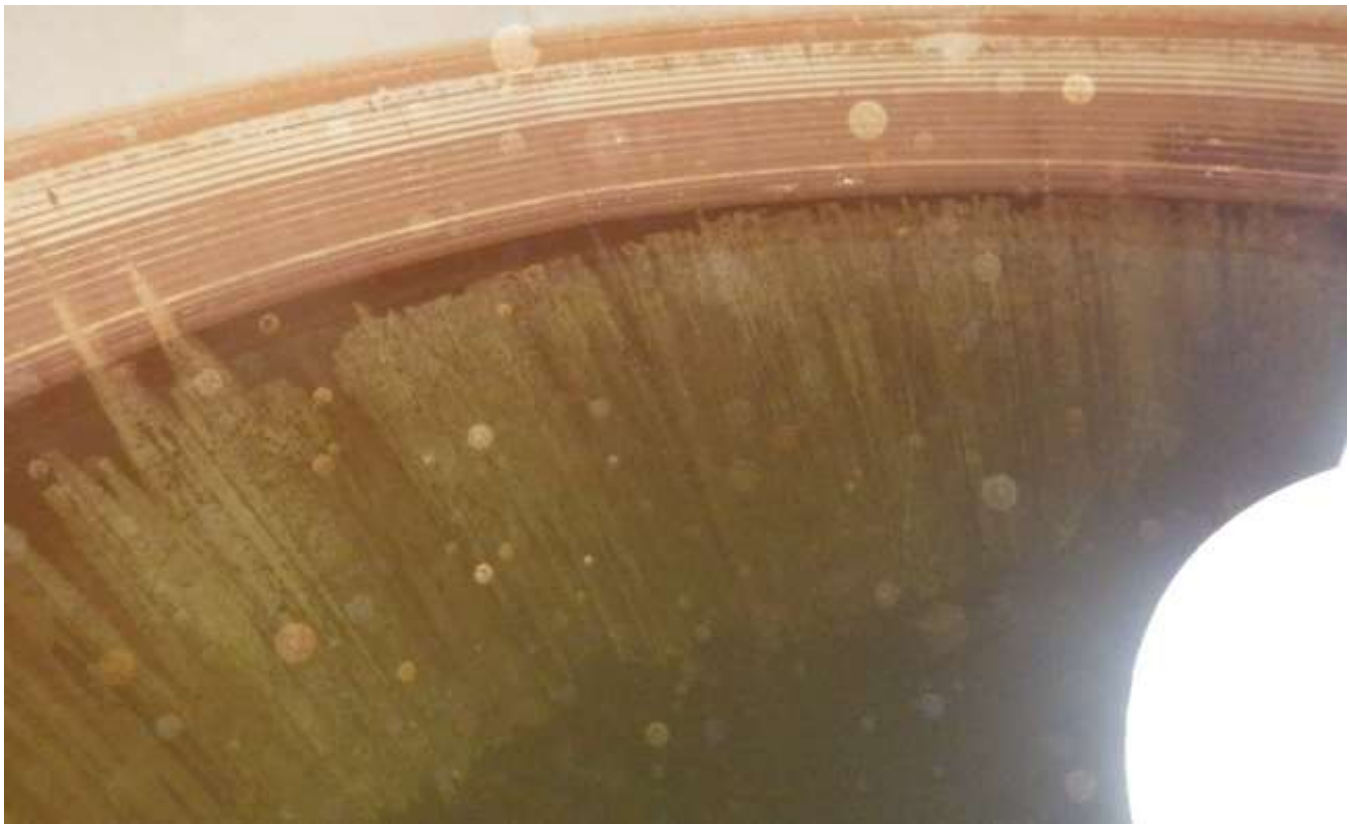
103. Water and silt on the interior wet bowl.



104. Spots of corrosion, rust tubercles, and rust staining on the interior wet bowl.



105. Spots of corrosion, rust tubercles, and rust staining on the interior wet bowl.



106. Water and silt on the bowl.