GREATARIO SERVICES

Glass Fused to Steel

Professional Inspection, Cleaning, Maintenance & Upgrades

Servicing Glass-Fused-to-Steel, Welded Steel and Concrete Tanks.

Complete Inspection Report

PROJECT NAME	Township of Huron
LOCATION	3405 Concession Rd 2, Ripley ON
INSPECTION DATE	May 5, 2021
INSPECTOR	Josh Rodrigues

GREATARIO SERVICES
PO BOX 399, INNERKIP, ON N0J 1M0
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CONTACT INFORMATION

CONTACT

Name: Nancy Mayhew

Title: Quality Assurance and Compliance Specialist

Phone: (519) 524-6583

Mobile:

Email: nancy.mayhew@veolia.com

TANK INFORMATION

Constructor:	Greatario	Tank Capacity:	2154m3
Dwg's Available:	Yes	Year Built:	1996
Dwg's Reviewed:	Yes	Diameter:	9.38m
Coating System:	Glass Fused to Steel	Height:	31.22m
Lining System:	Glass Fused to Steel	Tank S/N:	8960189

VICINITY INSPECTION

SAFETY PLACARDS

Installed:	◉ Yes	○ No
Readable:	◉ Yes	○ No

GROUNDS

Fence:	◉ Yes	○ No
Gate:	◉ Yes	○ No
Lock:	◉ Yes	○ No
Vandalism:	○ Yes	◉ No
Trespassing:	○ Yes	◉ No

Addition Notes

Tank is surrounded by barbed wire, chain link fencing with locked access gate. There are no signs of trespassing or vandalism. All safety placards are in place and are legible.

TANK EXTERIOR

ROOF

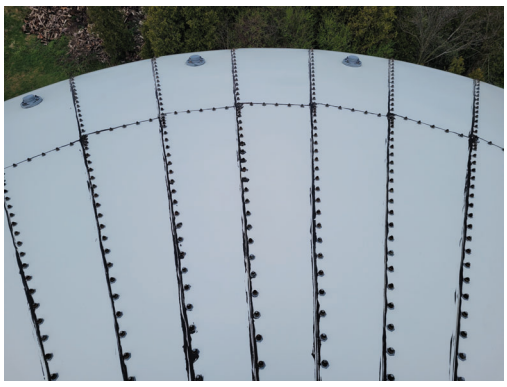
Type:	Bolted Knuckle
Panels:	Good
Panel Coating:	Good
Sealer/Silicon Condition:	Poor
Overall Condition:	Fair

ROOF VENT

Expanded Metal Screen:	Good
Insect Screen:	Poor
Hardware Condition:	Fair
Overall Condition	Fair

Addition Notes

Exterior of bolted steel knuckle style roof is in fair overall condition. Roof panels and glass coating is in good condition however sealer on sheet edges is in poor condition due to age with bare steel exposed on sheet edges throughout. Roof vent is in fair overall condition. Non manufacturer supplied vent hood has been previously installed, there is no fines mesh insect screen installed.



TANK EXTERIOR, CONTINUED

ROOF MANWAY

Quantity:	1
Hinges/Hardware:	Good
Size:	18"x24"
Overall Condition:	Good
Pad Lock Installed:	Yes

Addition Notes

One 18"x24" roof access manway is installed at top ladder platform location and is in good overall condition. All hardware is in place, hinges move freely and door is unobstructed when opening. There are no roof flanges installed.

ROOF FLANGES

Flanges Installed:	No
Condition of Flanges:	N/A
Condition of Hardware:	N/A

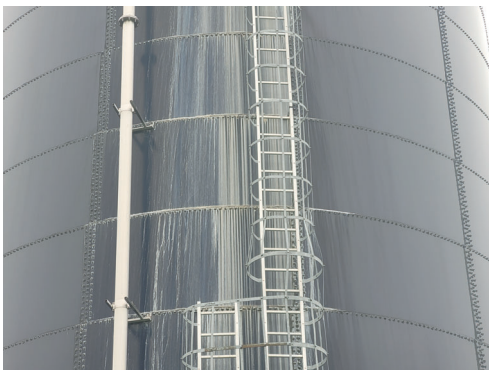
SIDEWALL & ACCESSORIES

TANK SHELL (Exterior)

Colour of Sheets/Sealer:	Blue/Black
Glass/Sheet Condition:	Good
Nut/Washer Condition:	Fair
Sealer Condition:	Poor
Web Truss Condition:	Good
Overall Condition:	Fair

Addition Notes

Exterior of tank panels and glass fused to steel coating are in good overall condition however panels are dirty with dirt/moss build up that should be cleaned. Sealer on panel edges is in poor condition with bare steel exposed throughout. Sealer should be replaced in very near future. Threads on exterior of bolts showing surface corrosion and should be sealed and capped.



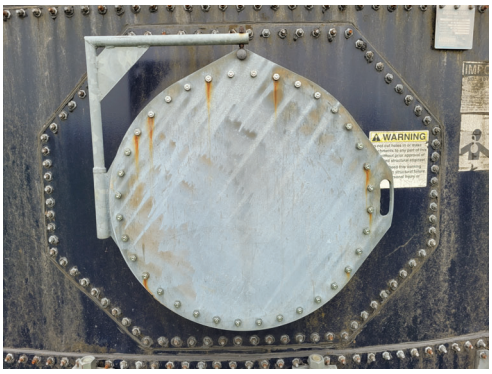
SIDEWALL & ACCESSORIES, CONTINUED

SIDEWALL MANWAY

Size:	30"
Quantity:	2
Gasket Condition:	Good
Bolt Condition:	Good
Corrosion Present:	Yes
Overall Condition:	Good

Addition Notes

Two 30" sidewall access manways are installed at ground level. Both manways are in good overall condition however staining from previously replaced hardware is present on door plates. Manway door plates should be prepared and re-coated on site.



SIDEWALL & ACCESSORIES, CONTINUED

TANK FOUNDATION

Concrete Curb:	Good
Erosion:	No
Cracking:	No
Settlement:	No
Anchor Bolts:	Yes
Anchor Bolts Condition:	Good

Addition Notes

Concrete curb/foundation is in good overall condition. There are no signs of cracking, settlement or erosion present. All anchors are in good overall condition with minor surface corrosion of anchor bolt nuts.

SIDEWALL & ACCESSORIES, CONTINUED

EXTERIOR LADDER/CAGE ASSEMBLY

Ladder Type:	Step Offs
Material:	Galvanized Steel
Cage Installed:	Yes
Ladder Gate Installed:	Yes
Fall Arrest System:	No
Corrosion Present:	No
Padlock Installed:	Yes
Overall Condition:	Good

Addition Notes

One caged roof access ladder is installed from ground to roof with 3 step off platforms. Ladder and platform assembly including hardware is in good overall condition. Ladder gate is installed and locked at base of ladder.

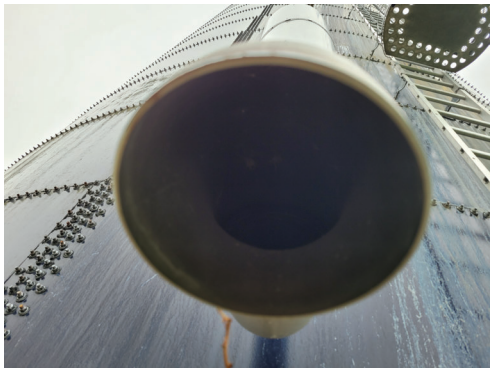
SIDEWALL & ACCESSORIES, CONTINUED

PIPING

Location:	West
Pipe Size:	6"
Pipe Type:	Stainless Steel
Direct to Ground:	No
Screen Installed:	No
Flapper Installed:	No
Pipe Brackets:	Good
Overall Condition:	Good

Addition Notes

One 6" stainless steel overflow pipe is installed on the west side of the tank. Piping, support brackets and hardware are in good overall condition. End of overflow pipe is currently exposed with no screen or flapper valve installed



TANK EXTERIOR INSPECTION SUMMARY

Exterior of tank wall and roof panels and glass fused to steel coating are in good overall condition. Exterior of tank surface is very dirty with heavy moss buildup on sidewalls that should be cleaned when possible.
All sealer on wall and roof sheet edges showing degradation due to age (25 years) and has separated from sheet edges throughout tank exterior leaving bare steel on sheet edges exposed with minor surface corrosion. General life expectancy of sealer is approximately 20-25 years and should be replaced when sheet edges become exposed. Bolt threads and nuts exposed on tank exterior should be sealed and capped when sealer is replaced.
Both sidewall access manways are in good overall condition however staining on door plates from previously replaced hardware is present. Door plates should be be prepared and coated on site.
Overflow piping is in good overall condition. It is recommended that a screen or valve be installed at open end of overflow pipe.

ADDITIONAL EXTERIOR PHOTOS

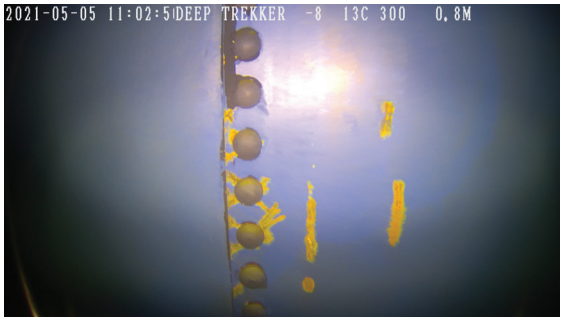
TANK INTERIOR INSPECTION

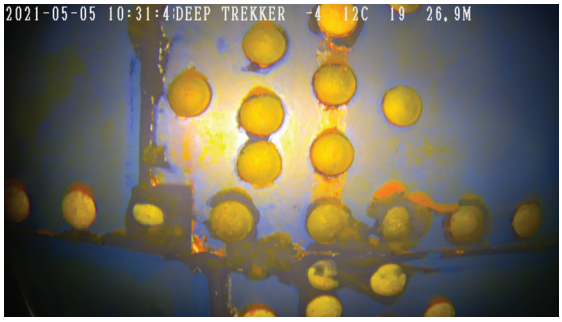
TANK SHELL (Interior)

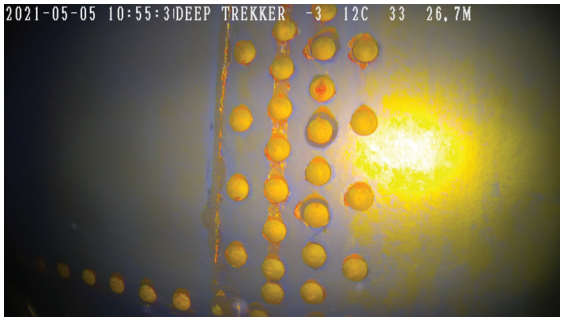
Colour of Sheets/Sealer:	Blue/Black
Glass/Sheet Condition:	Good
Encapsulated Bolt Condition:	Good
Sealer Condition:	Poor
Overall Condition:	Fair

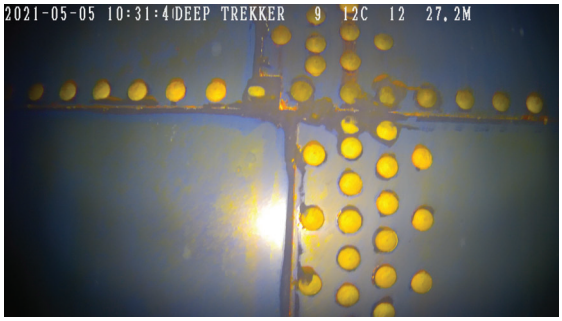
Addition Notes

Interior of tank wall panels and glass fused to steel coating is in good overall condition. Sealer showing compete degradation due to age on all sheet edges and bolt heads which should be replaced in near future. Many areas of bare steel exposed with minor corrosion on interior sheet edges









TANK INTERIOR INSPECTION, CONTINUED

FLOOR CONDITION: GLASS FLOOR

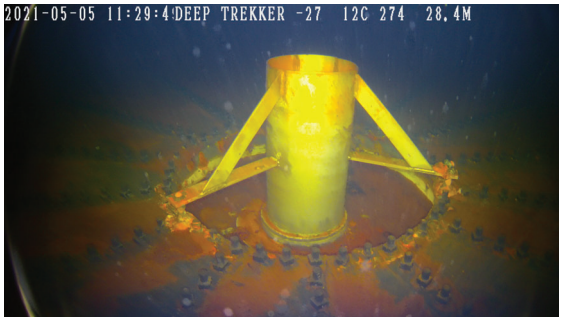
Sediment Thickness:	Heavy
Glass/Sheet Condition:	Unknown
Caps/Encapsulated Nuts:	Unknown
Sump/Link Seals:	Unknown
Anode Assembly:	Fair

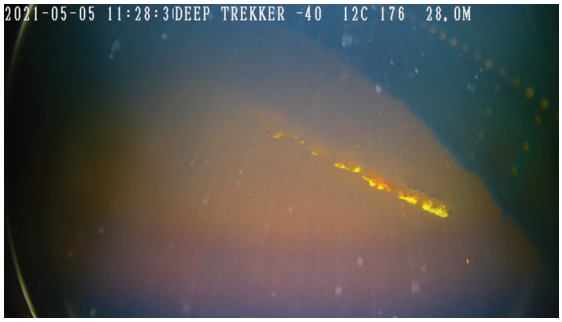
Addition Notes

A heavy layer of sediment covered the entirety of the tank floor which did not allow for visual inspection of floor surface. Anodes on tank floor were visible in areas and appear to be in good condition.

FLOOR CONDITION: CONCRETE FLOOR

Overall appearance of floor:	N/A
Appearance of perimeter Coating:	N/A
Condition of Piping:	N/A
Anode Assembly:	N/A

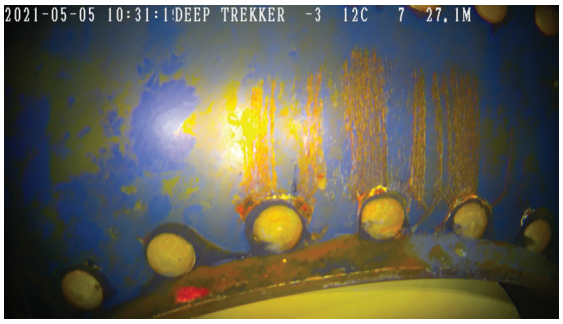


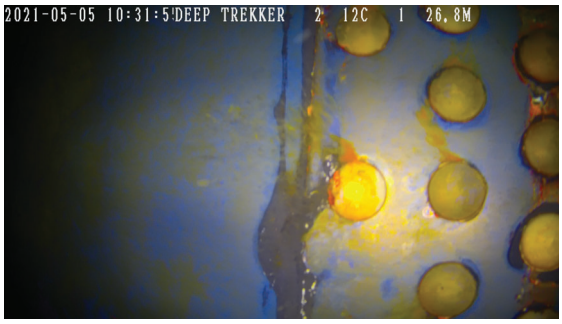


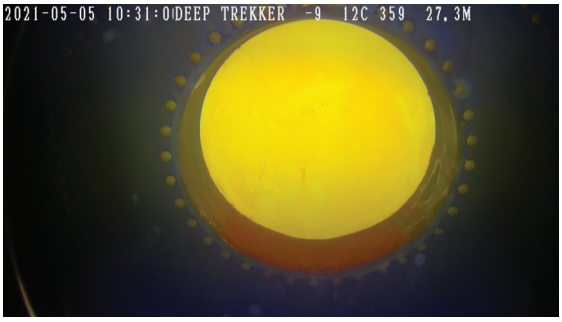
TANK INTERIOR INSPECTION SUMMARY

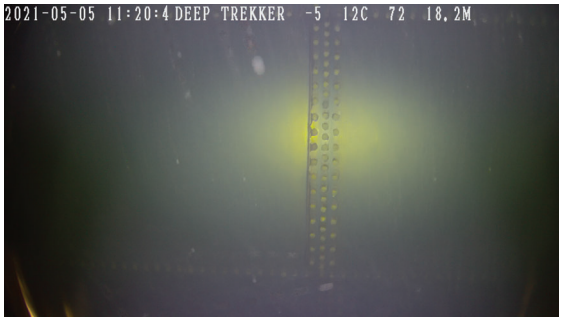
Interior of tank wall panels and glass fused to steel coating is in good overall condition.
Sealer on all interior sheet edges and bolts heads is no longer present throughout most of the tank leaving bare steel exposed with minor corrosion present. All interior sheet edges should be prepared and coated with new sealer in the near future.
Heavy layer of sediment covers the tank floor which did not allow for visual inspection of floor surface however is expected to be in similar condition to the interior tank walls.
Anodes were visible in some areas and appear to be in good overall condition however cathodic protection testing done at time of inspection determined the tank does not currently meet NACE criteria for adequate protection of a water storage tank. More anodes are likely required to protect areas of bare steel inside the tank (this may not be required once new sealer is installed)

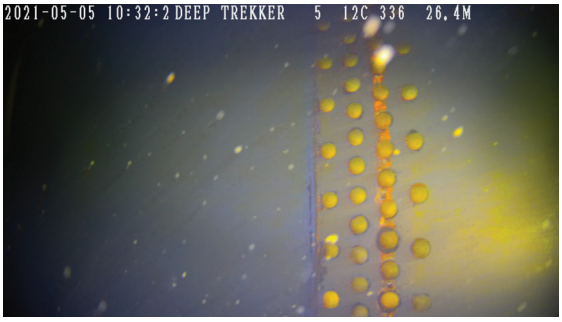
ADDITIONAL INTERIOR PHOTOS

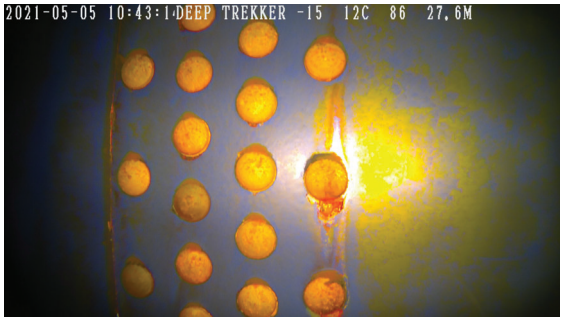








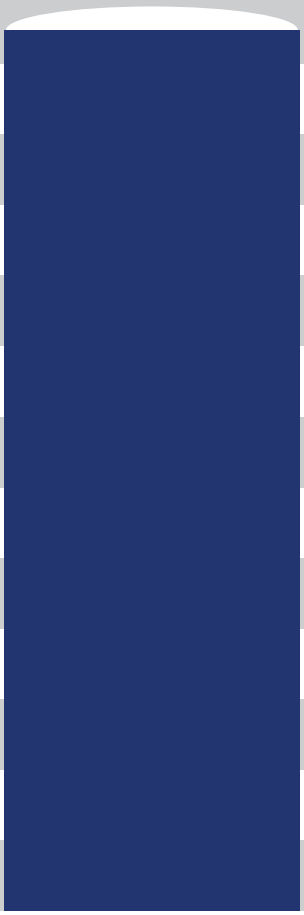




STRATIFICATION TESTING (ONLY APPLICABLE FOR ROV INSPECTIONS)

Water Temperature °C

Surface	13.00	**°C**
10 feet	13.00	**°C**
20 feet	13.00	**°C**
30 feet	13.00	**°C**
40 feet	13.00	**°C**
50 feet	13.00	**°C**
60 feet	13.00	**°C**
70 feet	12.00	**°C**
80 feet	12.00	**°C**
90 feet	12.00	**°C**
100 feet	12.00	**°C**
110 feet		**°C**
120 feet		**°C**



Cathodic Protection Test Report

Site Data and Liquid Properties

Project/Serial Number: 8960189

Site Name/Location: Township of Huron

Date of Installation: 1996

Tank Size

Diameter: 9.38m

Height: 31.22m

Type of Foundation *(check one)*

- ○ Embedded Starter
- ◉ Steel Floor
- ○ Buried
- ○ CET
- ○ Other:

Anode Material

- ○ Aluminum
- ◉ Magnesium
- ○ Zinc

Anode Placement

Number of primary anodes connected to tank:	6
Number of add-on anodes attached to each primary anode:	0
Total Number of add-on anodes:	0
Total Number of Anodes:	6

Type of Liquid Stored

- ◉ Potable Water
- ○ Waste Water
- ○ Animal Waste
- ○ Other:

Cathodic Protection Test Report

Inspection Report

Inspection Date: 05/05/2021

Inspection Time: 09:00

Equipment Used: Multimeter + CSE

Make: Fluke Model: 115 True RMS Serial No.: 16140728

Measured Readings

ph = 8.0

Liquid Temp. °C/°F= 15.7c

Resistivity Ω-cm= 1154.7344110854503

Conductivity µS/cm= 866

TDS mg/l, ppm 433

Design Information *(if known)*

ph =

Liquid Temp. °C/°F=

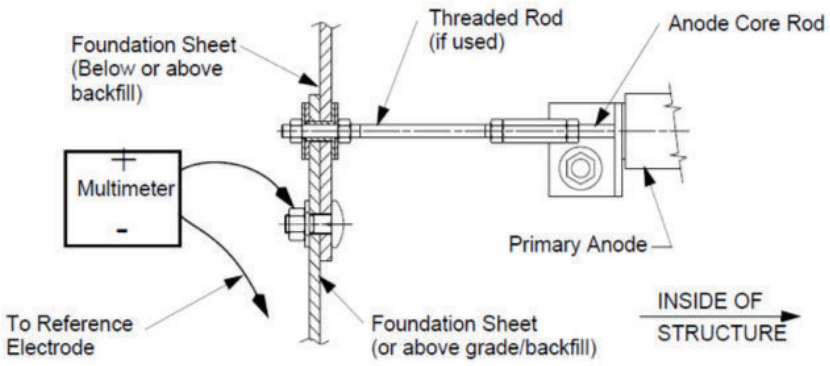
Resistivity Ω-cm=

Conductivity µS/cm=

TDS mg/l, ppm

Tank to Liquid "Native" Potential Measurements (VS Cu/CuSO4)

Top	-0.715 V CSE
25%	-0.721 V CSE
50%	-0.722 V CSE
75%	-0.724 V CSE
Bottom	-0.724 V CSE

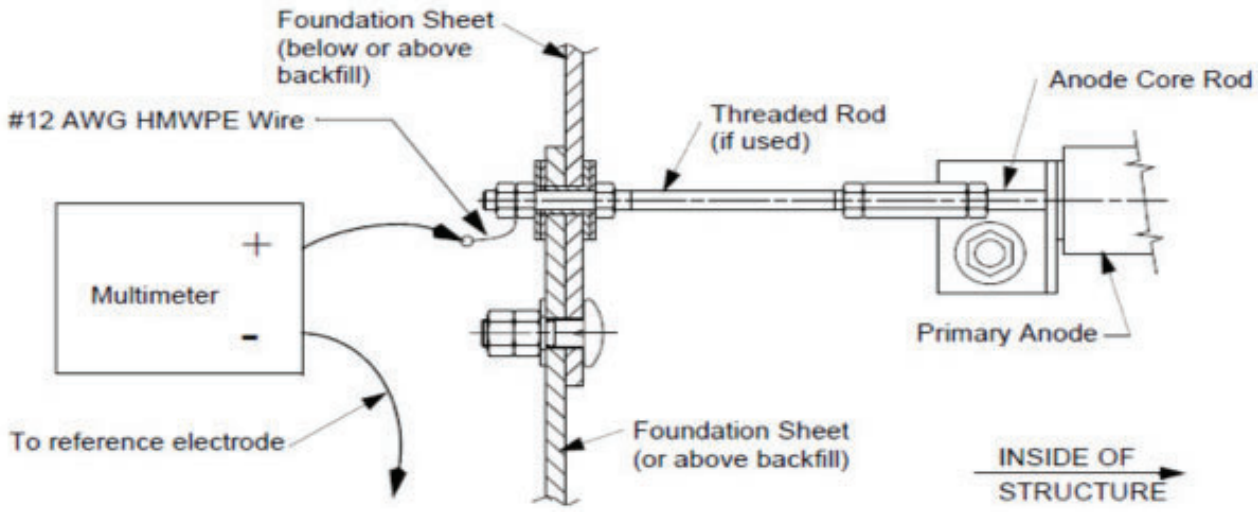


1. Disconnect All nodes Prior to Test
2. Positive - Structure Bolt
3. COM - Reference Electrode
4. Set Mulitmeter to DC V

Cathodic Protection Test Report

Anode Open Circuit Potential Measurements (VS Cu/CuSO4)

1	-1.619 V CSE	**11**	V CSE	**21**	V CSE
2	-1.535 V CSE	**12**	V CSE	**22**	V CSE
3	-1.550 V CSE	**13**	V CSE	**23**	V CSE
4	-1.547 V CSE	**14**	V CSE	**24**	V CSE
5	-1.526 V CSE	**15**	V CSE	**25**	V CSE
6	-1.448 V CSE	**16**	V CSE	**26**	V CSE
7	V CSE	**17**	V CSE	**27**	V CSE
8	V CSE	**18**	V CSE	**28**	V CSE
9	V CSE	**19**	V CSE	**29**	V CSE
10	V CSE	**20**	V CSE	**30**	V CSE

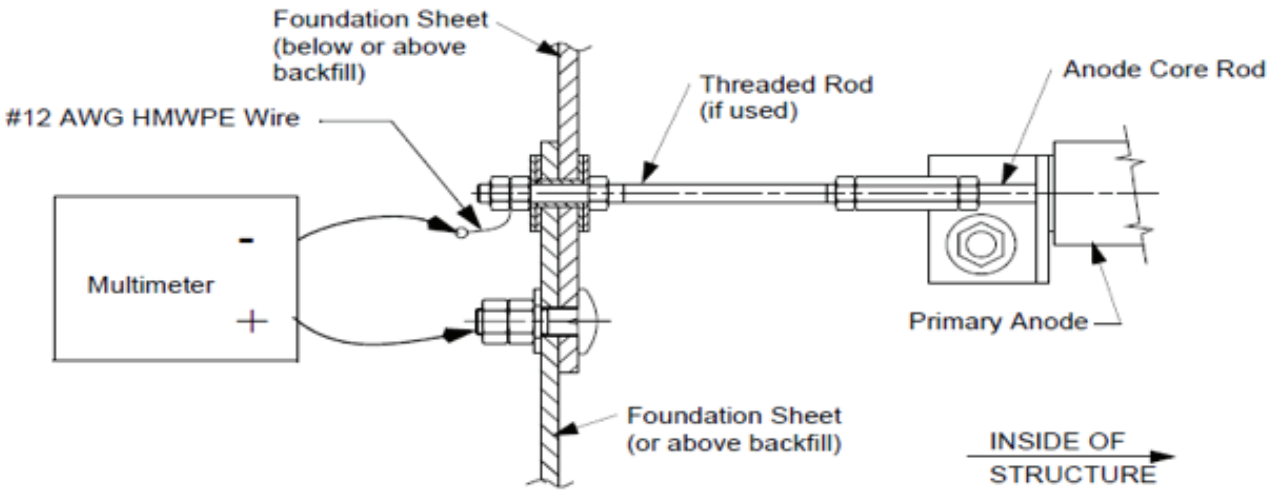


1. POSITIVE - Lead wire from anode
2. COM - Ref Electrode
3. Multimeter set to DC V

Cathodic Protection Test Report

Anode Current Output Measurements with Multimeter Direct Connection

1	0.042 A	**11**	A	**21**	A
2	0.027 A	**12**	A	**22**	A
3	0.031 A	**13**	A	**23**	A
4	0.021 A	**14**	A	**24**	A
5	0.034 A	**15**	A	**25**	A
6	0.034 A	**16**	A	**26**	A
7	A	**17**	A	**27**	A
8	A	**18**	A	**28**	A
9	A	**19**	A	**29**	A
10	A	**20**	A	**30**	A

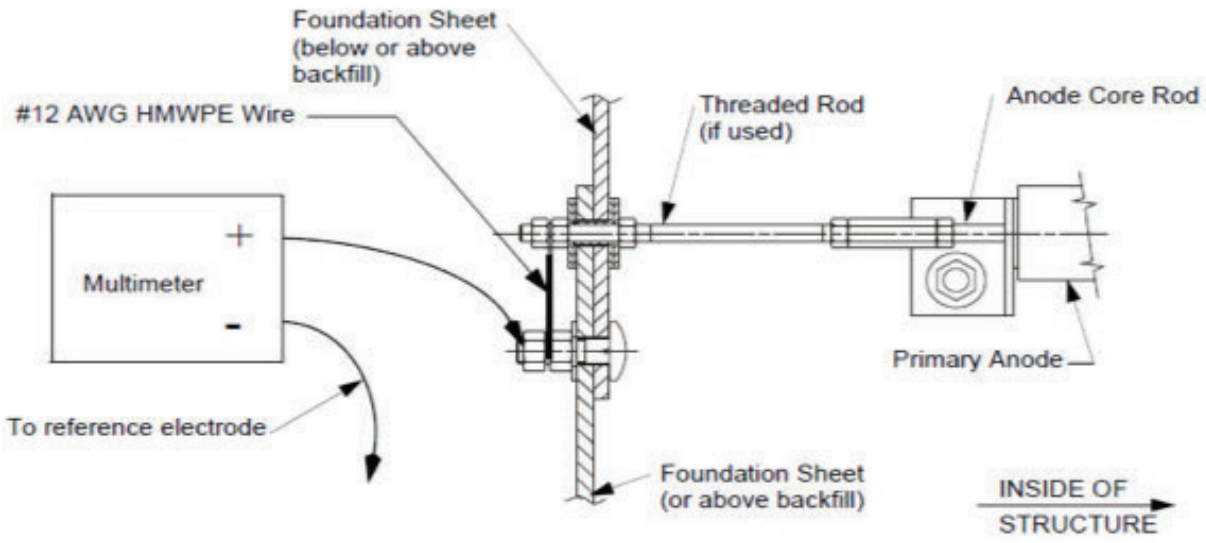


1. POSITIVE - Structure
2. COM - Lead Wire from Anode
3. Multimeter set to DC A

Cathodic Protection Test Report

Tank to Liquid "ON" Potential Measurements (VS Cu/CuSO4)

1	-0.732 V CSE	**11**	V CSE	**21**	V CSE
2	-0.738 V CSE	**12**	V CSE	**22**	V CSE
3	-0.747 V CSE	**13**	V CSE	**23**	V CSE
4	-0.757 V CSE	**14**	V CSE	**24**	V CSE
5	-0.764 V CSE	**15**	V CSE	**25**	V CSE
6	-0.777 V CSE	**16**	V CSE	**26**	V CSE
7	V CSE	**17**	V CSE	**27**	V CSE
8	V CSE	**18**	V CSE	**28**	V CSE
9	V CSE	**19**	V CSE	**29**	V CSE
10	V CSE	**20**	V CSE	**30**	V CSE



1. POSITIVE - Structure
2. COM - Ref Electrode
3. Multimeter set to DC V

Cathodic Protection Test Report

150mV Cathodic Protection Potential Development Calculation*

Anode	"ON"		"Native" Value			Result	
1	-0.732	*mV*	-0.715	*mV*	=	-0.017000000000	*mV*
2	-0.738	*mV*	-0.715	*mV*	=	-0.023000000000	*mV*
3	-0.747	*mV*	-0.715	*mV*	=	-0.032000000000	*mV*
4	-0.757	*mV*	-0.715	*mV*	=	-0.042000000000	*mV*
5	-0.764	*mV*	-0.715	*mV*	=	-0.049000000000	*mV*
6	-0.777	*mV*	-0.715	*mV*	=	-0.062000000000	*mV*
7		*mV*		*mV*	=	0	*mV*
8		*mV*		*mV*	=	0	*mV*
9		*mV*		*mV*	=	0	*mV*
10		*mV*		*mV*	=	0	*mV*
11		*mV*		*mV*	=	0	*mV*
12		*mV*		*mV*	=	0	*mV*
13		*mV*		*mV*	=	0	*mV*
14		*mV*		*mV*	=	0	*mV*
15		*mV*		*mV*	=	0	*mV*
16		*mV*		*mV*	=	0	*mV*
17		*mV*		*mV*	=	0	*mV*
18		*mV*		*mV*	=	0	*mV*
19		*mV*		*mV*	=	0	*mV*
20		*mV*		*mV*	=	0	*mV*
21		*mV*		*mV*	=	0	*mV*
22		*mV*		*mV*	=	0	*mV*
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24		*mV*		*mV*	=	0	*mV*
25		*mV*		*mV*	=	0	*mV*
26		*mV*		*mV*	=	0	*mV*
27		*mV*		*mV*	=	0	*mV*
28		*mV*		*mV*	=	0	*mV*
29		*mV*		*mV*	=	0	*mV*
30		*mV*		*mV*	=	0	*mV*

*Only required if step 7 does not reach -900 mV

RECOMMENDED MAINTENANCE & ACTION PLAN

1) Complete interior and exterior tank rehabilitation including;
- exterior tank cleaning
- removal of sediment and tank floor cleaning
- removal of all remaining sealer on sheet edges and bolt heads
- installation of new sealer fillets on all interior and exterior sheet edges
- prepare all bolts on tank exterior and install sealed, protective bolt caps

2) Install screen or valve at open end of overflow pipe

3) Re-coat both sidewall access manway door plates

4) Install additional anodes if required

NEXT INSPECTION DUE

2024

NEXT INSPECTION TYPE

Exterior Inspection
&
Cathodic Protection Testing

REPORT PREPARED BY

Scott Plant
Service Manager, Greatario

PURPOSE OF THIS INSPECTION REPORT

GREATARIO Service is pleased to provide the following Inspection Report ("Report"). The purpose of this Report is to communicate the conditions actually observed during GREATARIO's inspection through its use of remotely operated vehicles ("ROV"). GREATARIO's ROV inspection is limited to conditions which were actually visible to the ROV operator and will not discover nor result in discovery of any conditions not entirely or clearly visible during GREATARIO's inspection. The conditions which are entirely and actually visible and discovered during GREATARIO's inspection are provided in this Report. Subject to the LIMITATIONS OF THIS REPORT below, GREATARIO's inspection was an ROV inspection of the tank exterior, interior, and piping of the water storage facility for the purpose of generating the Report and providing recommended maintenance. GREATARIO has not undertaken any inspection nor does its Report reflect the condition of any structural components or mechanical systems.

LIMITATIONS OF THIS REPORT

GREATARIO's Report is based on its interpretation of information, observations, and data provided to GREATARIO by others and collected by GREATARIO during its inspection. This Report is provided solely for the purpose of reporting the findings of GREATARIO's general inspection of the water storage facility. GREATARIO is not a licensed engineering firm nor does it make any representations relating to any structural or mechanical component requiring licensure as a registered engineer. Specifically, GREATARIO makes no report, statement, recommendation, or other representation of any type related to the water storage facilities structural or mechanical integrity, condition, capacity, adequacy or conformance with any applicable law, regulation, or code. GREATARIO does not warrant that its services, observations, data, recommendations, or Report will be free from any such errors or defects or that any such errors or defects will be corrected by GREATARIO. GREATARIO does not warrant or make any representations regarding the use of the Report, any recommendations, or other content, specifically including, but not limited to, its correctness, accuracy, completeness, reliability, safety, or otherwise. GREATARIO is not responsible for and loss or damage caused by, arising out of the use of, or reliance on its services, observations, data, recommendations, or Report generated.

NOTES

The attached report has been prepared in order to provide the owner with a detailed description of the following: The present condition of interior and exterior coatings, any pitting and/or corrosion on the interior of the water retaining vessel, the apparent condition of exposed foundations and the status of and recommendations for upgrades on safety equipment and other appurtenances.

GREATARIO SERVICES has not performed a design review, an ultrasonic, x-ray, or destructive and/or non-destructive testing. Comments and recommendations are based on visual inspection only.