



TO: Phil Zavadil, City Manager, City of Saint Paul

FROM: Camille House, Inspector, Integrity Environmental LLC

DATE: January 30, 2023

SUBJECT: Cathodic Protection Testing for Buk Fuel Storage Facility in City of Saint Paul, Alaska

Integrity Environmental LLC (Integrity) performed cathodic protection testing at the Buk Fuel Storage Facility located in City of Saint Paul, Alaska. The potential measurements and rectifier data were recorded on May 11 – 12, 2022. The cathodic protection testing was recorded by an authorized inspector certified, as a NACE Cathodic Protection Tester (CP1), in accordance with the criteria provided in both NACE SP0193-2016 and NACE SP0169-2013.

1. Inspection Results

Test results indicate that the existing system is providing adequate levels of cathodic protection at the areas tested per the criteria found in both NACE SP0169 and NACE SP0193. Cathodic Protection (CP) testing was performed at the piping test locations and on the in-service tank bottoms. Refer to Section 4 below for details of the potential measurements.

2. Inspection Recommendations

- Continue annual cathodic protection testing by a certified inspector.
- Continue to perform and document monitoring of the rectifier by a qualified person. The qualified person should read and log the rectifier panel readings as well as note the condition of the power source and/or the overall unit.
- Monitor and maintain corrosion protection such as coatings and piping wrap at all locations on the piping that enters/exits the ground.
- Monitor and maintain areas of piping that enters/exits the ground to keep it free of vegetation (roots) and buildup of dirt/debris.

3. NACE SP0169 & SP0193 Cathodic Protection Criteria

Criteria applicable to evaluation:

1. A negative structure-to-soil potential of at least 850 mV with the cathodic protection current applied (“On” reading). The potential is measured with respect to a saturated copper/copper sulfate reference electrode (CSE) contacting the soil. Potential drops other than those across the structure-to-soil boundary must be considered for valid interpretation of the voltage measurement.
2. A negative polarized structure-to-soil potential (“Instant Off” reading) of at least 850 mV relative to a CSE.
3. A minimum of 100 mV of cathodic protection polarization between the structure surface and a CSE contacting the soil. The formation or decay of polarization can be measured to satisfy this criterion.

4. Scope of Inspection

Inspections were planned to record levels of CP for tank bottoms #1, #3, #4, #6, #9 and the multiple piping test locations (TL). Note: tank bottoms #2, #5, #7, #8 were not tested because these tank bottoms were empty. Potential measurements were recorded using a Fluke 28 II multimeter with a portable CSE reference cell and/or a permanent electrode reference cell, as applicable. The polarization shift measurements were recorded after the max duration of 24 hours. Refer to Table 4-1 and Table 4-2 for details of both tank farm rectifier units. Refer to Table 4-3 and Table 4-4 for details of the potential measurements.

Table 4-1 Tank Farm - Rectifier Unit #1

Manufacturer:	Universal Rectifiers, Inc.
Install Date:	September 1998
Model No.:	CSA-ASAI
Serial No.:	985029
AC Input Rating:	115/230 volts, 16.3/8.1 amps
DC Output Rating:	60 volts, 22 amps
Phase/Frequency:	60/1
Ambient Temp.:	50 Degrees Celsius
Shunt Size:	50.0 mV = 25.0 amps
Tap settings (coarse-fine):	C-2/F-6
DC Output Panel Voltmeter:	54.0 VDC
DC Output Panel Ammeter:	8.5 amps

Table 4-2 Tank Farm - Rectifier Unit #2

Manufacturer:	Universal Rectifiers, Inc.
Install Date:	April 2003
Model No.:	CSA-ASAI
Serial No.:	030759
AC Input Rating:	115/230 volts, 16.3/8.1 amps
DC Output Rating:	60 volts, 22 amps
Phase/Frequency:	60/1
Ambient Temp.:	50 Degrees Celsius
Shunt Size:	50.0 mV = 25.0 amps
Tap settings (coarse-fine):	C-3/F-1
DC Output Panel Voltmeter:	54.5 VDC
DC Output Panel Ammeter:	10.0 amps

Table 4-3 Piping Test Locations (TL) - Potential Measurements with CSE

Piping TL# / Line ID	Testing Location Description	"On" Potential (mV CSE)	Depolarized Potential (mV CSE)
TL #1: 8-inch line	Piping behind pumphouse from south dock	-1211	-514
TL #2: 4-inch line	Piping at pumphouse to truck loading area	-1295	-552
TL #3: 8-inch line	Piping at pumphouse to tank farm	-988	-502
TL #4: 8-inch line	Piping at tank farm berm from pumphouse	-1219	-472
TL #5: 4-inch line	Piping from pumphouse to truck loading area	-902	-514
TL #6: 2-inch line	Piping at truck loading area	-981	-486
TL #7: 8-inch line	Piping at south dock to pumphouse	-893	-636

Table 4-4 Tanks - Potential Measurements with CSE

Measurements Locations	Tank #1	Tank #3	Tank #4	Tank #6	Tank #9
"On" Potential (mV CSE) Testing location 0°	-1204	-1439	-1517	-1464	-2324
Depolarized Potential (mV CSE) Testing location 0°	-680	-645	-576	-562	-578
"On" Potential (mV CSE) Testing location 90°	-1375	-1311	-1775	-1302	-2132
Depolarized Potential (mV CSE) Testing location 90°	-608	-737	-610	-655	-666
"On" Potential (mV CSE) Testing location 180°	-1398	-1254	-1272	-1177	-1509
Depolarized Potential (mV CSE) Testing location 180°	-501	-653	-547	-648	-518
"On" Potential (mV CSE) Testing location 270°	-1447	-1299	-1557	-1179	-1564
Depolarized Potential (mV CSE) Testing location 270°	-515	-715	-628	-658	-537

Thank you for providing Integrity Environmental LLC the opportunity to work on this project. Refer to Attachment A for inspection photos. Tank bottoms tested and piping test locations are shown on Attachment B. Attachment C includes inspector certification. I am available for further questions or concerns.

Respectfully,

A handwritten signature in blue ink that reads "C. House".

Camille House, Inspector
NACE Cathodic Protection Tester (CP1) Cert #59942
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Attachment A: Inspection Photos
Attachment B: Testing Locations
Attachment C: Inspector Certification

Attachment A
Inspection Photos



Photo 1: View of south dock testing location (orange test station on right).



Photo 2: View of testing location behind pumphouse (orange test station on right).



Photo 3: View of testing locations at the front of pumphouse and outside the tank farm.



Photo 4: View of testing location at the truck loading area.



Photo 5: Overall view of the tank farm.



Photo 6: Overall view of tank #9.



Photo 7: View of rectifier unit #1 (top).



Photo 8: View of rectifier unit #2 (bottom).

Attachment B
Testing Locations

Figure B-1 Tank Farm Test Locations

Current to: 5/12/2022
 Author: Integrity Environmental LLC
<http://www.integrity-env.com>



City of Saint Paul
 Diamond Hill Road
 Saint Paul Island, AK 99660
 Within: Sec 19, T. 35 S., R. 131 W.,
 Seward Meridian, Alaska.
 Tank Farm: 57 8' 1.71"N
 170 16' 0.96"W
 USGS 63K Quad: Pribilof Islands C-4
 Coordinate System:
 NAD 1983 Alaska Albers

- ◆ Piping Test Location
- CP Tested Tank
- Tank (Not CP Tested)
- ▼ Isolation Valve
- Fuels Office
- T Tank Truck Loading Rack
- Rectifier
- Aboveground Pipeline
- Belowground Pipeline
- Secondary Containment Area

Tanks 2, 5, 7, and 8 not tested because empty.

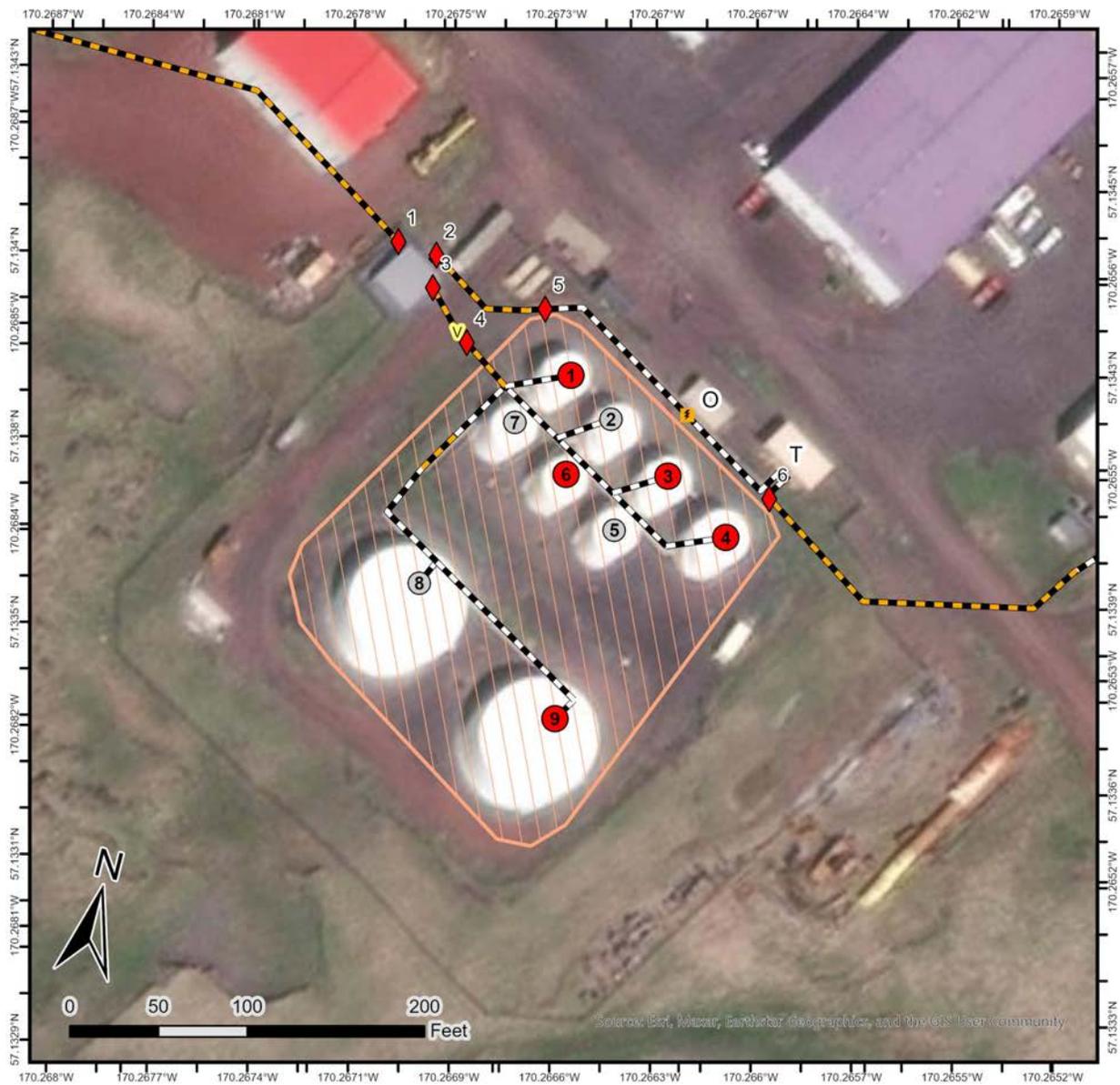


Figure B-2 Dock Piping Test Locations

Current to: 5/12/2022
 Author: Integrity Environmental LLC
<http://www.integrity-env.com>



City of Saint Paul
 Diamond Hill Road
 Saint Paul Island, AK 99660
 Within: Sec 25, T. 35 S., R. 132 W.,
 Seward Meridian, Alaska.
 Tank Farm: 57 7' 23.30667" N 170 17' 4.15848" W
 USGS 63K Quad: Pribilof Islands C-4
 Coordinate System: NAD 1983 Alaska Albers

- ◆ Piping Test Location
- ★ Marine Header
- H Harbor Office
- V Isolation Valve
- Spill Response Equipment
- Aboveground Pipeline
- Belowground Pipeline



Attachment C

Inspector Certifications



Certificate of Achievement

The NACE International Institute Recognizes

Camille Harder House

As a Certified

CP1 - Cathodic Protection Tester

Helena Subinger

Executive Director
NACE International Institute



Expires
May 31, 2024

Cert No.59942