UST CATHODIC PROTECTION SYSTEM EVALUATION GALVANIC (SACRIFICIAL ANODE) TYPE

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WASTE MANAGEMENT – UNDERGROUND STORAGE TANK PROGRAM
SFN 60641 (08-2022)

Telephone: 701-328-5166
Fax: 701-328-5200
Email: ndust@nd.gov
Website: https://deq.nd.gov/wm

Instructions: Within 30 days, send completed form to:

North Dakota Department of Environmental Quality
Division of Waste Management
4201 Normandy Street
Bismarck ND 58503-1324

- All reports must be submitted regardless of results (pass, fail, or inconclusive).
- Incomplete, unsigned, or illegible forms will not be accepted and will be returned.

Clear Form

ND UST ID Number

1. UST FACILITY

Name		
Address		
City	State	ZIP Code
County	Telephone Number	
Name of Contact		Telephone Number

2. UST OWNER/OPERATOR

Name		
Address		
City	State	ZIP Code
County	Telephone Number	
Name of Contact		Telephone Number

3. CATHODIC PROTECTION (CP) TESTER INFORMATION AND QUALIFICATIONS

Name of Tester		Name of Company	
Address		City	State / ZIP Code
Telephone Number	E-mail Address		
National Association of Corrosion Engineers (NACE) International Certification Number		Steel Tank Institute (STI) Certification Number	

4. TEST REQUIREMENTS

Reason Test Was Conducted (check one)

☐ Routine - 3 year ☐ Routine - within 6 months of install ☐ 30-day re-survey after fail ☐ Re-survey within 6 months of

DATE NEXT SURVEY MUST BE CONDUCTED BY: (Required within 6 months of installation/repair and every 3 years)

5. EVALUATION

CP Tester's Evaluation (check one)

☐ **Pass**	All protected structures at this facility pass the CP survey and the continuity survey indicates all protected structures are isolated. It is judged that adequate CP has been provided to the UST system. (Complete Sections 7 and 8.)
☐ **Fail**	One or more protected structures at this facility fail the CP survey, and it is judged that adequate CP has not been provided to the UST system. (Complete Sections 7 and 8.)
☐ **Inconclusive**	The remote and the local do not both indicate the same test result on all protected structures (both pass or both fail),or the continuity survey indicates continuous or inconclusive results when compared to non-protected structures, the survey must be evaluated by a corrosion expert. (Corrosion expert to complete Section 6.)

Date CP Test Performed:

Name of Facility	Test Date

6. CORROSION EXPERT'S EVALUATION (if applicable)

A Corrosion Expert is needed to evaluate certain metal structures. See Appendix A at the end of this form for more information.

☐ **Pass** All protected structures at this facility have been evaluated to have adequate CP provided to the USTsystems.

☐ **Fail** One or more protected structures at this facility fail the CP survey and it has been evaluated that adequate CP has not been provided to the UST system.

Name of Corrosion Expert	Telephone Number
Name of Corrosion Company	
NACE Int./PE Certification	NACE Int./PE Certification Number
Signature of CP Expert	Date

7. EVALUATION CRITERIA

Criteria Applicable to Evaluation (check all that apply)

☐ **850 On** Structure-to-soil potential more negative than -850 millivolts (mV) with respect to a reference cell with the protective current applied

☐ **Other** Other method allowed by the NDDEQ UST Program. Please describe:

8. ACTION REQUIRED

Action Required as a Result of this Evaluation (check only one)

☐ **None** CP is adequate. No further action is necessary at this time. Test again by no later than (see Section 4).

☐ **Retest** CP may not be adequate. Retest within 30 days to determine if passing results can be achieved. (Retests may occur only if all protected structures are isolated from non-protected structures.)

☐ **Repair and Retest** CP is not adequate. Repair/modification is necessary within the next 60 days; or permanently close the tank system.

9. CP SYSTEM REPAIRS AND/OR MODIFICATION INFORMATION

Date of "Failing" Test	Date of Repair	Name of Repair Company
Name of Lead Repair Technician		Telephone Number
Certification of Repair Technician (check all that apply) ☐ **Steel Tank Institute** ☐ **NACE**		**Note:** submit failing test results with this report

Description of Repairs (check all that apply)

1. ☐ Supplemental anodes for a sti-P3® tank.
2. ☐ Supplemental anodes for metallic pipe which is factory coated with dielectric material (fusion bonded epoxy or equivalent).
3. ☐ Supplemental anodes for a non-sti-P3® tank (e.g., bare steel).
4. ☐ Supplemental anodes for metallic pipe which is non-factory coated with dielectric material (e.g., galvanized, copper, bare steel, etc.)
5. ☐ Isolation of galvanically protected tanks/piping (explain in "remarks/other" below).
6. ☐ Isolation of non-protected metal pipe segments (e.g., flex connectors) at STP or dispenser sumps (explain in "remarks/other").

Repairs/modifications for 1 and 2 must be designed by a "corrosion expert" or installed per industry standards.

Repairs/modifications for 3 and 4 must be designed and evaluated by a "corrosion expert" only.

Remarks/Other

Name of Facility	Test Date

10. GALVANIC (SACRIFICIAL ANODE) STRUCTURE TO SOIL POTENTIAL AND CONTINUITY SURVEY

Structure to Soil Potentials:

Half Cell Placement (testing) on frozen soil, concrete, asphalt, or other paving materials is not acceptable.

- The half cell must be placed in a minimum of three locations per tank, and three locations per piping run. At least one of the reference cell locations must be in the soil directly over the tested structure (local); and at least one must be placed in soil approximately 25 to100 feet away from the structure (remote). The third location is at the discretion of the tester (either local or remote).
- When testing flex connectors only, two test points are required for each flex connector, one local and one remote. If separate corrosion protection is required on flex connectors, treat each flex as if it were an individual metal pipe when recording results.
- Both the local and the remote voltage must meet the -0.85 volts criteria in order for the structure to pass.
- Inconclusive must be indicated when both the local and the remote structure-to-soil potentials do not result in the same outcome (both pass or both fail).

Continuity Testing: (Point-to-Point and/or Fixed Cell-Moving Ground):

- **Point-to-Point:** When conducting this method, the leads of the volt meter are required to contact the two structures being examined to demonstrate isolation or continuity. A half cell is not used for this test method.
- **Fixed Cell-Moving Ground:** When conducting this method, the half cell must be placed in the soil at a remote location approximately 25 to100 feet away and left undisturbed. The other lead of the meter is moved to structures being evaluated.
- To interpret continuity data for either method compare the difference in voltage of the structures evaluated and use the following guidelines: 1 mV or less = continuous, 1-10 mV= inconclusive, greater than 10 mV = isolated.
- For galvanic systems, the structure that is to be protected must be isolated from all other non-protected metallic structures in order to “pass” the continuity survey.
- If other approved continuity testing methods are used, alter this form or submit the data on a separate sheet.

Describe soil type and location(s) of remote reference cell placement(s)
(e.g., Black Dirt, 30 feet NW of Tank #1 spill bucket):

Remote Location #1
Remote Location #2

Example for Recording Results

Structure to Soil Potentials (mV)			Continuity Testing (mV)			
Half Cell Site Map Code	**Half Cell Placement Description**	**"ON" Voltage**	**Structure Tested**	**Point-to-Point Voltage**	**Fixed Cell Remote Voltage**	**Isolated/ Continuous/ Inconclusive**
Structure: *Tank1- 10,000 gallon premium*						
L1	*Local, Soil at ATG manway*	*-1011 mV*	*ATG Conduit*	*475 mV*		*Isolated*
L2	*Local, Soil at STM manway*	*-995 mV*	*STPG Conduit*		*-528 mV*	*Isolated*
R1	*Remote #1*	*-1042 mV*	*Vent*	*421 mV*		*Isolated*
Structure Contact Point(s): *Tank Bottom*			*Fill Riser*	*375 mV*	*-522 mV*	*Isolated*
Overall Structure Results (structure to soil potentials and continuity):			☒ Pass	☐ Fail	☐ Inconclusive	

Name of Facility	Test Date

Number 10 continued on next page

Structure to Soil Potentials (mV)			Continuity Testing (mV)			
Half Cell Site Map Code	Half Cell Placement Description	"ON" Voltage	Structure Tested	Point-to-Point Voltage	Fixed Cell Remote Voltage	Isolated/ Continuous/ Inconclusive
Structure:						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	
Structure:						
Structure Contact Point(s):						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	
Structure:						
Structure Contact Point(s):						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	
Structure:						
Structure Contact Point(s):						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	

Name of Facility	Test Date

Structure to Soil Potentials (mV)			Continuity Testing (mV)			
Half Cell Site Map Code	**Half Cell Placement Description**	**"ON" Voltage**	**Structure Tested**	**Point-to-Point Voltage**	**Fixed Cell Remote Voltage**	**Isolated/ Continuous/ Inconclusive**
Structure:						
Structure Contact Point(s):						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	
Structure:						
Structure Contact Point(s):						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	
Structure:						
Structure Contact Point(s):						
Overall Structure Results (structure to soil potentials and continuity):			☐ Pass	☐ Fail	☐ Inconclusive	

Comments

Attach additional sheets as needed

Name of Facility	Test Date

11. DESCRIPTION OF UST SYSTEM

Tank/ Pipe No.	Product	Capacity (Gallons)	Tank Type[1]	Piping Type[2]	Metal Segments at Tank Sump[3]	Metal Segments at Dispenser[3]
1						
2						
3						
4						
5						
6						
7						
Ex:	*Premium*	*10,000*	*SW Bare Steel*	*SW Fiberglass*	*Bonded to IC System*	*In Containment*

1. Indicate if tank is Double Wall (DW) or Single Wall (SW). Also indicated type (e.g., steel, fiberglass, sti-P3®, composite etc.). Also indicate if tank is compartmental if applicable.
2. Indicate if piping is Double Wall (DW) or Single Wall (SW). Also indicate type (e.g., coated steel, fiberglass, galvanized, flex, etc.).
3. Indicate how metal segments such as flex connectors or metal pipe segments are protected from corrosion (e.g., isolated, booted, bonded, in containment, etc.).

12. UST FACILITY SITE DRAWING

Attach detailed drawing or use the space provided to draw a sketch of the UST and CP systems. At a minimum, you should indicate the following: All tanks, piping and dispensers; location of anodes and wires if known; buildings and streets; location of CP test stations; each reference cell placement must be indicated by a code (e.g., 1,2, T-1,) corresponding with the appropriate test in Section 10 of this form. If supplemental anodes are added to the tank system, indicate number, size, location and depth of the new anodes. **An evaluation of the CP system is not complete without an acceptable site drawing.**

APPENDIX A - SUPPLEMENTAL GUIDELINES FOR CORROSION PROTECTION

Corrosion Expert's Evaluation

A corrosion expert is anyone who is NACE International certified as a "Corrosion Specialist" or "Cathodic Protection Specialist" or is a Registered Professional Engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metal piping systems and metal tanks.

A corrosion survey must be conducted by or evaluated by a corrosion expert when:

1. Conducting repairs to metallic structures which are non-factory coated with dielectric material;
2. Adding supplemental anodes to the tanks and/or piping without following accepted industry standards;
3. The local and remote structure-to-soil potential did not result in the same outcome (both pass or both fail);
4. It is known or suspected that a stray current may be affecting the protected structure;
5. Making a repair or adding a supplemental anode to bare steel tanks/piping that is galvanically protected;
6. The metal structure being tested is poorly coated or the coating is damaged;
7. Field installing corrosion protection systems; or
8. Required by the North Dakota Department of Environmental Quality.

In addition, for impressed current systems, a corrosion expert is required when

1. Installing an impressed current system;
2. Anodes were added or replaced;
3. Anode header cables are repaired or replaced;
4. Continuity was not established between all protected structures;
5. The rectifier is repaired or replaced;
6. Adjustments to the rectifier current output are made;
7. The rectifier is not working correctly; or
8. The rectifier is not operating in ranges established by a corrosion expert.

Testing Criteria

The -0.85 volt current-on criterion is the most commonly used test method for evaluating coated metal tanks and piping with galvanic corrosion protection. However, it cannot be used on metal structures that are poorly coated or not coated. Poorly coated or bare steel galvanic tank systems must use the -0.85 volt current-off or the 100 millivolt polarization test method and you must complete SFN 60640. If the -0.85 volt current-off or 100 millivolt polarization test method cannot be used for these systems, a corrosion expert will need to evaluate the system.