UST-7B

NORTH CAROLINA CATHODIC PROTECTION SYSTEM EVALUATION FOR IMPRESSED CURRENT SYSTEMS

- This form must be utilized to evaluate underground storage tank (UST) cathodic protection systems in the State of North Carolina.
- A copy of this completed form must be submitted by the owner /operator to the NCDENR UST Section, at the address listed below, within 30 days of testing.
- Access to the soil directly over the cathodically protected structure that is being evaluated must be provided.
- A site drawing depicting the UST cathodic protection system and all reference electrode placements must be completed.

I. UST OWNER

Name:	
Address:	
City:	**State:**

II. UST FACILITY

Name:	**Facility ID:**
Address:	
City:	**County:**

III. REASON SURVEY WAS CONDUCTED (mark only one)

☐ Routine – 3 year ☐ Routine – within 6 months of installation ☐ Re-survey as soon as the cathodic protection system reaches steady-state polarization design standards after repair/modification (complete Section XI)

IV. CATHODIC PROTECTION TESTER'S EVALUATION (mark only one)

☐ **PASS**	All protected structures at this facility pass the cathodic protection and continuity survey (indicate all criteria applicable by completion of Section VI).
☐ **FAIL**	One or more protected structures at this facility fail the cathodic protection and/or continuity survey (complete Section VII).
☐ **INCONCLUSIVE**	If the remote and the local do not both indicate the same test result on all protected structures (both pass or both fail), inconclusive is indicated and/or if the continuity survey indicates inconclusive or isolated results the survey must be evaluated and/or conducted by a corrosion expert (Section V must be completed by a Corrosion Expert).

Tester Name:			**Name of Certifying Organization (e.g., NACE):**
Company Name:			**Certification Type (e.g., CP Tester, CP Technician):**
Address:			**Certification Number:**
City:	**State:**	**Zip:**	**Phone:**

CP Tester's Signature:	**Date Signed:**	**Date CP Survey Performed:**

V. CORROSION EXPERT'S EVALUATION (mark only one)

The survey must be conducted and/or evaluated by a corrosion expert when: a) supplemental anodes or other changes in the construction of the impressed current system are made; b) a stray current may be affecting buried metallic structures; c) an inconclusive result was indicated in Section IV; or d) when required by NCDENR.

☐ **PASS**	All protected structures at this facility are judged to have adequate cathodic protection and therefore pass the cathodic protection and continuity survey (indicate all criteria applicable by completion of Section VI).
☐ **FAIL**	One or more protected structures at this facility fail or do not pass the cathodic protection and/or continuity survey and it is judged that adequate cathodic protection is not currently being provided to the UST system (indicate what action is necessary by completion of Section VII).

Corrosion Expert's Name:	**NACE International Certification Type or Professional Engineer (PE) Specialty:**
Company Name:	**NACE International Certification Number or PE Number / State:**

Address:	**City:**	**State:**	**Zip:**	**Phone:**

Corrosion Expert's Signature:	**Date:**

VI. CRITERIA APPLICABLE TO EVALUATION (mark all that apply)

☐ **850 mV Instant OFF**	Structure-to-soil potential more negative than -850 mV with respect to a $Cu/CuSO_4$ reference electrode with protective current temporarily interrupted (instant-off).
☐ **100 mV Polarization**	Structure tested exhibits at least 100 mV of cathodic polarization.

VII. ACTION REQUIRED AS A RESULT OF THIS EVALUATION (mark only one)

☐ **NONE**	Cathodic protection is adequate. No further action is necessary at this time.
☐ **REPAIR & RETEST**	Cathodic protection is not adequate. Immediately repair and/or modify cathodic protection system so that adequate cathodic protection is provided and then have the system re-tested as soon as the cathodic protection system reaches steady-state polarization design standards..

Date next cathodic protection survey must be conducted by (required every 3 years)

VIII. DESCRIPTION OF UST SYSTEM

TANK #	PRODUCT STORED (PREMIUM, REGULAR, DIESEL, ETC.)	TANK CAPACITY (GAL)	CONSTRUCTION MATERIAL (TANKS)	CONSTRUCTION MATERIAL (PIPING)	FLEX CONNECTORS PRESENT (Y/N)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

IX. IMPRESSED CURRENT RECTIFIER DATA (complete all that are applicable)

Rectifier Manufacturer:

Note: In order to conduct an effective evaluation of the cathodic protection system, a complete evaluation of the rectifier is necessary.

Rectifier Model:

Rectifier Serial Number:

Rectifier Output as Initially Designed or Last Recommended: _____ Volts _____ Amps

Rated DC Output: _____ Volts _____ Amps

EVENT	DATE	TAP SETTINGS		DC OUTPUT		HOUR METER	COMMENTS
		COARSE	FINE	VOLTS	AMPS		
"AS FOUND"							
"AS LEFT"							

X. IMPRESSED CURRENT POSITIVE & NEGATIVE CIRCUIT MEASUREMENTS (output amperage)

Complete if the system is designed to allow such measurements (i.e. individual lead wires for each anode are installed and measurement shunts are present).

CIRCUIT	1	2	3	4	5	6	7	8	9	10	TOTAL
ANODE (+)											
TANK (-)											

XI. DESCRIPTION OF CATHODIC PROTECTION SYSTEM REPAIRS AND/OR MODIFICATIONS

Cathodic protection systems must be evaluated as soon as the cathodic protection system reaches steady-state polarization design standards following any repairs and/or modifications. Complete this section if any repairs or modifications were made to the cathodic protection system in response to a "failed" evaluation. Certain repairs/modifications as determined by NCDENR are required to be designed and/or evaluated by a corrosion expert (completion of Section V required).

- ☐ Supplemental anodes for an impressed current system were needed (attach corrosion expert's design).
- ☐ Repairs or replacement of rectifier was needed (explain in "Remarks/Other" below).
- ☐ Repair or replacement of anode header cables were needed (explain in "Remarks/Other" below).
- ☐ Impressed current protected tanks/piping are not electrically continuous (explain repairs/modifications completed in "Remarks/Other" below).
- ☐ Adjustments were made to the rectifier output

Remarks/Other:

XII. UST FACILITY SITE DRAWING

Attach detailed drawing of the UST and cathodic protection systems. Sufficient detail must be given in order to clearly indicate where the reference electrode was placed for each structure-to-soil potential that is recorded on the survey forms. Any pertinent data must also be included. At a minimum you should indicate the following: All tanks, piping and dispensers; All buildings and streets; All anodes and wires; Location of CP test stations; Each reference electrode placement must be indicated by a code (e.g., 1,2,3… T-1, T-2, P-1, P-2… etc.) corresponding with the appropriate line number in Section XIV of this form.

AN EVALUATION OF THE CATHODIC PROTECTION SYSTEM IS NOT COMPLETE WITHOUT AN ACCEPTABLE SITE DRAWING.

XIII. IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM CONTINUITY SURVEY

- This section may be utilized to conduct measurements of continuity on underground storage tank systems that are protected by cathodic protection systems.
- When conducting a fixed cell – moving ground survey, the reference electrode must be placed in the soil at a remote location and left undisturbed.
- Conduct point-to-point test between any two structures for which the fixed cell-moving ground survey is inconclusive or indicates possible isolation.
- For impressed current systems, the protected structure must be continuous with all other protected structures in order to pass the continuity survey.

FACILITY NAME:

NOTE: The survey is not complete unless all applicable parts of Sections I-XIV are also completed

DESCRIBE LOCATION OF "FIXED REMOTE" REFERENCE ELECTRODE PLACEMENT:

STRUCTURE "A" [1]	STRUCTURE "B" [2]	STRUCTURE "A" [3] FIXED REMOTE INSTANT OFF VOLTAGE	STRUCTURE "B" [4] FIXED REMOTE INSTANT OFF VOLTAGE	POINT-TO-POINT [5] VOLTAGE DIFFERENCE	ISOLATED/ CONTINUOUS/ INCONCLUSIVE [6]
(example) PLUS TANK BOTTOM	(example) PLUS STEEL PRODUCT LINE @ STP	(example) -915 mV	(example) -908 mV		(example) INCONCLUSIVE
(example) PLUS TANK BOTTOM	(example) PLUS STEEL PRODUCT LINE @ STP			(example) 1 mV	(example) CONTINUOUS

COMMENTS:

1) Describe the cathodically protected structure {"A"} that you are attempting to demonstrate is continuous (e.g., plus tank bottom).
2) Describe the "other" protected structure {"B"} that you are attempting to demonstrate is continuous (e.g., plus steel product line @ STP).
3) Record the fixed remote instant off structure-to-soil potential of the protected structure {"A"} in millivolts (e.g., -915 mV).
4) Record the fixed remote instant off structure-to-soil potential of the "other" protected structure {"B"} in millivolts (e.g., -908 mV).
5) Record the voltage observed between structure "A" and structure "B" when conducting "point-to-point" testing (e.g., 1 mV).
6) Document whether the test (fixed cell and/or point to point) indicated the protected structure was isolated, continuous or inconclusive by using the following guidelines.

Fixed Cell – Moving Ground Method
Isolated = Structures exhibit potentials that vary by 10 mV or more
Continuous = Structures exhibit potentials that vary by 2 mV or less
Inconclusive = Structures exhibit potentials that vary by 2mV or more but less than 10 mV

Point-to-Point Method
Isolated = Voltage difference is 10 mV or greater
Continuous = Voltage difference is 1 mV or less
Inconclusive = Voltage difference is greater than 1 mV but less than 10 mV

XIV. IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM SURVEY

- This section may be utilized to conduct a survey of an impressed current protection system by obtaining structure-to-soil potential measurements.
- The reference electrode must be placed **locally** in a minimum of **three** locations in the soil directly over the tested structure **and** as far away from any active anode as practical to obtain a valid structure-to-soil potential.
- Both "on" and "instant off" potentials must be measured for each structure that is intended to be under cathodic protection.
- The "instant off" potential must be -850 mV or more negative or the 100 mV polarization criterion must be satisfied in order to pass.

FACILITY NAME:

NOTE: The survey is not complete unless all applicable parts of Sections I-XIV are also completed

LOCATION CODE[1]	STRUCTURE [2]	CONTACT POINT [3]	REFERENCE CELL PLACEMENT [4]	ON VOLTAGE[5]	INSTANT OFF VOLTAGE[6]	100 mV POLARIZATION		PASS / FAIL[9]
						ENDING VOLTAGE[7]	VOLTAGE[8]	
(example) T-1	(example) PLUS TANK	(example) TANK BOTTOM	(example) SOIL @ REG. TANK STP MANWAY	(example) -1070 mV	(example) -875 mV			(example) PASS
(example) P-2	(example) DIESEL PIPING	(example) DISPENSER 7/8	(example) SOIL @ DIESEL TANK STP MANWAY	(example) -810 mV	(example) -680 mV	(example) -575 mV	(example) -105 mV	(example) PASS

COMMENTS:

1) Designate numerically or by code on the site drawing each "local" reference electrode placement (e.g., 1,2,3… T-1, T-2, P-1, P-2…etc.).
2) Describe the structure that is being tested (e.g., plus tank; premium piping; diesel submersible pump flex connector; etc.).
3) Describe where the structure being tested is contacted with the test lead (e.g., plus tank bottom; diesel piping @ dispenser 7/8; etc.).
4) Describe the exact location where reference electrode is placed for each measurement (e.g., soil @ regular tank STP manway; soil @ dispenser 2, etc.)
5) {Applies to all tests} Record the structure-to-soil potential (voltage) observed with the current applied (e.g., -1070 mV).
6) {Applies to all tests} Record the structure-to-soil potential (voltage) observed when the current is interrupted (e.g., -680 mV).
7) {Applies to 100 mV polarization test only} Record the voltage observed at the end of the test period (e.g., -575 mV).
8) {Applies to 100 mV polarization test only} Subtract the ending voltage from the instant off voltage (e.g., -680mV - (-575 mV) = -105 mV).
9) Indicate if the tested structure passed or failed one of the two acceptable criteria (850 mV instant off or 100 mV polarization) based on your interpretation of data.