VIRGINIA DEQ

CATHODIC PROTECTION SYSTEM EVALUATION FORM

7531-CP (05/06)

- This form should be utilized to evaluate underground storage tank (UST) cathodic protection systems in the Commonwealth of Virginia.
- 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: **PHONE:**

STATE: **ZIP:**

II. UST FACILITY

NAME: **ID #**

ADDRESS:

CITY: **COUNTY:**

STATE: **ZIP:** **PHONE:**

III. REASON SURVEY WAS CONDUCTED (mark only one)

Routine - 3 year | Routine – within 6 months of installation | 90-day re-survey after fail | Re-survey after repair/modification

Date next cathodic protection survey must be conducted (required within 6 months of installation/repair & every 3 years thereafter).

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

	PASS	All protected structures at this facility pass the cathodic protection survey and it is judged that adequate cathodic protection has been provided to the UST system (indicate all criteria applicable by completion of Section VI).
	FAIL	One or more protected structures at this facility fail the cathodic protection survey and it is judged that adequate cathodic protection has not been provided to the UST system(s) (complete Section VII).

TESTER'S NAME: **SOURCE OF CERTIFICATION:**

COMPANY NAME: **TYPE OF CERTIFICATION:**

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 cathodic protection system are made; b) stray current may be affecting buried metallic structures or c) an inconclusive result was written in Section VI. (except for under STI-R972 – "Recommended Practice for the Addition of Supplemental Anodes to sti-P3 ® UST's")

	PASS	All protected structures at this facility pass the cathodic protection survey and it is judged that adequate cathodic protection has been provided to the UST system (indicate all criteria applicable by completion of Section VI).
	FAIL	One or more protected structures at this facility fail the cathodic protection survey and it is judged that adequate cathodic protection has not been provided to the UST system (indicate what action is necessary by completion of Section VII).

CORROSION EXPERT'S NAME: **SOURCE OF CERTIFICATION:**

COMPANY NAME: **TYPE OF CERTIFICATION:**

ADDRESS: **CERTIFICATION NUMBER:**

CITY: **STATE:** **ZIP:** **PHONE:**

CORROSION EXPERT'S SIGNATURE: **DATE:**

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

	- 850mV ON / (Instant) OFF (circle "ON" or "OFF" to specify)	Structure-to-soil potential more negative than –850 mV with respect to a $Cu/CuSO_4$ reference electrode with protective current ON (galvanic) or temporarily interrupted (instant-OFF (impressed)). **Inconclusive?**
	100 mV POLARIZATION	Structure(s) exhibit at least 100 mV of cathodic polarization. **Inconclusive?**

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. Test again by no later than (see Section V).
	RETEST	Cathodic protection may not be adequate. Retest during the next 90 days to determine if passing results can be achieved.
	REPAIR & RETEST	Cathodic protection is not adequate. Repair/modification is necessary as soon as practical but within the next 90 days.

VIII. DESCRIPTION OF UST SYSTEM

TANK	PRODUCT	CAPACITY	TANK MATERIAL	PIPING MATERIAL	FLEX CONNECTORS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

IX. IMPRESSED CURRENT RECTIFIER DATA (complete all applicable)

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

RECTIFIER MANUFACTURER:	**RATED DC OUTPUT:** **VOLTS** **AMPS**
RECTIFIER MODEL:	**RECTIFIER SERIAL NUMBER:**

RECTIFIER OUTPUT AS INITIALLY DESIGNED OR LASTLY RECOMMENDED (if available): _____ **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 AMPS
ANODE (+)											
TANK (-)											

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

Complete if any repairs or modifications to the cathodic protection system are made OR are necessary. Certain repairs/modifications as explained in the text of the VADEQ cathodic protection guidance document are required to be designed and/or evaluated by a corrosion expert (completion of Section V required).

- ☐ Additional anodes for an impressed current system (attach corrosion expert's design) .
- ☐ Supplemental anodes for a STI-P3\ tank or metallic pipe (attach corrosion expert's design or documentation industry standard was followed).
- ☐ Repairs or replacement of rectifier (explain in "Remarks/Other" below).
- ☐ Anode header cables repaired and/or replaced (explain in "Remarks/Other" below).
- ☐ Impressed current protected tanks/piping not electrically continuous (explain in "Remarks/Other" below).
- ☐ Galvanically protected tanks/piping NOT electrically isolated (explain in "Remarks/Other" below).

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 indicate the following: all tanks, piping and dispensers; all buildings and streets; all anodes and wires; location of CP test stations; and, each reference electrode placement must be indicated by a code followed by a “IC” or “G” to indicate the type of CP system (e.g., R1-IC, R2-G, etc.) corresponding with the appropriate line number in Section XIV of this form. (Note, CP test stations (PP4)may be questionable for use as

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

XIII. CATHODIC PROTECTION SYSTEM CONTINUITY SURVEY

- This section may be utilized to conduct measurements of continuity on UST 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.
- For galvanic systems, the structure that is to be protected must be isolated from any other metallic structure 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 VOLTAGE (mV)**	**STRUCTURE "B"[4] FIXED VOLTAGE (mV)**	**POINT-TO-POINT[5] VOLTAGE DIFFERENCE**	**ISOLATED/ [6] CONTINUOUS**
(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

1. Describe the 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 difference observed between structure "A" and structure "B" when conducting "point-to-point" testing (e.g. 1mV).
6. Document whether the test (fixed cell and/or point-to-point) indicated the protected structure was isolated, continuous or inconclusive.

XIV. CATHODIC PROTECTION SYSTEM SURVEY

This section may be utilized to conduct a survey of the cathodic protection system by obtaining structure-to-soil potential measurements.

- **For Impressed Current (IC) systems**: the reference electrode must be placed (minimum of three locations) in the soil directly above the structure that is being tested and as far away from any active anode as practical to obtain a valid structure-to-soil potential (refer to the VADEQ cathodic protection evaluation guidance document for detailed discussion of electrode placement).
- 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 DC or more negative or the 100 mV DC polarization criterion must be satisfied in order to pass.

- **For Galvanic (G) systems:** the reference electrode must be placed (minimum of three locations) with at least one local and at least one placed remotely 25-100 feet away from the structure.
- Both the local and remote voltage must be –850 mV DC or more negative, in order for the structure to pass.
- Inconclusive is indicated when both the local and remote structure-to-soil potentials do not result in the same outcome (both must "pass" or both must "fail").
- As a place to record the "galvanic CP system voltage", use the "On Voltage" fifth column below; and, in cases with supplemental anodes use the "Instant Off" column six.

FACILITY NAME:

NOTE: This survey is not complete unless all applicable parts of sections I – XIV are also completed.

LOCATION[1] CODE	STRUCTURE [2]	CONTACT POINT[3]	REFERENCE CELL PLACEMENT[4]	ON[5] VOLTAGE	INSTANT [6] OFF VOLTAGE	100 mv polarization		PASS/[9] FAIL
						ENDING[7] VOLTAGE	VOLTAGE CHANGE[8]	
(example) R1-IC	(example) PLUS STEEL UST	(example) TANK BOTTOM	(example) SOIL @ PLUS TANK STP MANWAY	(example) -1070mV	(example) -875 mV			(example) PASS
(example) R2A-IC	(example) DIESEL PIPE	(example) DISPENSER 7/8	(example) SOIL @ DIESEL TANK STP MANWAY	(example) -810 mV	(example) -680 mV	(example) -575 mV	(example) 105 mV	(example) PASS
(example) R2B-IC	(example) DIESEL PIPE	(example) DISPENSER 7/8	(example) SOIL @ DIESEL TANK STP MANWAY	(example) -810 mV	(example) -720 mV	(example) -630 mV	(example) 90 mV	(example) FAIL
(example) R3A-G	**(example) PREMIUM sti-P3®**	**(example) TANK BOTTOM**	**(example) SOIL @ PREM. TANK STP MANWAY**	**(example) -960 mV**	**(example) NA**	**(example) NA**	**(example) NA**	**(example) PASS**
(example) R3B-G	**(example) PREMIUM sti-P3®**	**(example) TANK BOTTOM**	**(example) SOIL @ PREM. TANK STP MANWAY**	**(example) -580 mV**	**(example) NA**	**(example) NA**	**(example) NA**	**(example) FAIL**
(example) R3C-G	**(example) PREMIUM sti-P3®**	**(example) TANK BOTTOM**	**(example for supplemental anode cases) SOIL @ PREM. TANK STP MANWAY**	**(example)-- 1070mV**	**(example) -855mV**	**(example) NA**	**(example) NA**	**(example) PASS**

COMMENTS:

Use copies of this page as needed for additional reference cell readings.

1. **Designate numerically or by code on the site drawing each local reference electrode placement (e.g. R1-IC, R2-G, R3-IC...etc.)**
2. **Describe the structure that is being tested (e.g. plus tank; diesel piping; flex connector, etc.)**
3. **Describe where the structure being tested is contacted by the test lead (e.g. plus tank bottom; diesel piping @ dispenser 7/8; etc.)**
4. **Describe the exact location where the 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 final voltage from the instant off voltage (e.g. 680 mV – 575 mV = 105 mV.)**
9. **Indicate if the tested structure passed or failed one of the two acceptable criteria (850 instant off or 100 mV polarization) based on your interpretation of data.**