

STATE OF MISSISSIPPI GALVANIC (SACRIFICIAL ANODE) CATHODIC PROTECTION SYSTEM EVALUATION

- This form must be utilized to evaluate underground storage tank (UST) cathodic protection systems in the State of Mississippi.
- 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 | | II. UST FACILITY | |
|--------------|--------|------------------|---------|
| NAME: | | NAME: | ID # |
| ADDRESS: | | ADDRESS: | |
| CITY: | STATE: | CITY: | COUNTY: |

| III. CP TESTER | | IV. CP TESTER'S QUALIFICATIONS | |
|----------------|--------|--|--|
| TESTER'S NAME: | | NACE INTERNATIONAL CERTIFICATION NUMBER: | |
| COMPANY NAME: | | MDEQ CERTIFICATION NUMBER: | |
| ADDRESS: | | OTHER (EXPLAIN): | |
| CITY: | STATE: | | |

V. REASON SURVEY WAS CONDUCTED (mark only one)

Routine - 3 year
 Within 6 months of installation
 Re-survey after repair/modification
 Other (specify): _____

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

| | |
|--|---|
| <input type="checkbox"/> 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 VIII). |
| <input type="checkbox"/> 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 (complete Section IX). |
| <input type="checkbox"/> 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 the survey must be evaluated and/or conducted by a corrosion expert (complete Section VII). |

| | |
|------------------------|---------------------------|
| CP TESTER'S SIGNATURE: | DATE CP SURVEY PERFORMED: |
|------------------------|---------------------------|

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

The survey must be conducted and/or evaluated by a corrosion expert when: a) an inconclusive is indicated for any protected structure since both the local and the remote structure-to-soil potentials do not result in the same outcome (both pass or both fail); b) repairs to galvanized or uncoated steel piping are conducted or c) supplemental anodes are added to the tanks and/or piping without following an accepted industry code.

| | |
|--------------------------------------|---|
| <input type="checkbox"/> 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 VIII). |
| <input type="checkbox"/> 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 IX). |

| | |
|-----------------------------------|--|
| CORROSION EXPERT'S NAME: | COMPANY NAME: |
| NACE INTERNATIONAL CERTIFICATION: | NACE INTERNATIONAL CERTIFICATION NUMBER: |
| CORROSION EXPERT'S SIGNATURE: | DATE: |

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

| | |
|---|---|
| <input type="checkbox"/> 850 ON | Structure-to-soil potential more negative than -850 mV with respect to a Cu/CuSO ₄ reference electrode with the protective current applied (This criterion is applicable to any galvanically protected structure). |
| <input type="checkbox"/> 850 OFF | Structure-to-soil potential more negative than -850 mV with respect to a Cu/CuSO ₄ reference electrode with protective current temporarily interrupted (This criterion is applicable only to those galvanic systems where the anodes can be disconnected). |
| <input type="checkbox"/> 100 mV POLARIZATION | Structure tested exhibits at least 100 mV of cathodic polarization (This criterion is applicable to galvanic systems where the anodes can be temporarily disconnected). |

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

| | |
|---|---|
| <input type="checkbox"/> REPAIR & RETEST | Cathodic protection is not adequate. Repair as soon as practical but within the next 90 days and retest. |
| <input type="checkbox"/> Repair Needed | Cathodic protection is adequate and passes, however there are boots or sumps present that do NOT adequately protect the piping termination from corrosion. Repair as soon as practical but within the next 90 days. |
| <input type="checkbox"/> NONE | Cathodic protection is adequate. No further action is necessary at this time. |

The next "routine" cathodic protection survey must be conducted by _____ (every 3 years thereafter).

X. DESCRIPTION OF UST SYSTEM

| TANK # | PRODUCT | CAPACITY | TANKS MATERIAL | INSTALL | PIPING MATERIAL | INSTALL |
|--------|---------|----------|----------------|---------|-----------------|---------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |

PIPING TERMINATIONS

| LOCATION | TYPE OF CORROSION PROTECTION | LOCATION | TYPE OF CORROSION PROTECTION | LOCATION | TYPE OF CORROSION PROTECTION |
|--------------------------|------------------------------|----------------------------|------------------------------|--------------------------|------------------------------|
| (example) REGULAR STP | (example) SUMP | (example) DISP 1/2 SUMP | (example) GALVANIC | (example) PREMIUM STP | (example) BOOTED |
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Cathodic Protection Reference Cell Calibration Information

| Cell # | Date last calibrated | Calibrated by: | Potential Difference (mV) |
|--------|----------------------|----------------|---------------------------|
| 1 | | | |
| 2 | | | |

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

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

- Supplemental anodes added for a sti-P₃[®] tank (attach corrosion expert's design or documentation industry standard was followed).
- Supplemental anodes added to directly buried metallic pipe (attach corrosion expert's design or documentation industry standard was followed).
- Supplemental anodes added for directly buried metallic piping terminations.
- Supplemental anodes added for metallic piping terminations in containment sumps.
- Galvanically protected tanks/piping or piping terminations electrically isolated (explain in "Remarks/Other" below).
- Other (explain):

Comments:

Description of Repairs Needed:

XII. UST FACILITY SITE DRAWING

Attach detailed drawing or use the space provided to draw a sketch 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 and correspond with the location recorded in Section XIV of this form.

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

XIII. GALVANIC (SACRIFICIAL ANODE) 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 continuity.
- 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 ID NUMBER: _____

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: _____

| STRUCTURES TESTED | | POINT – TO – POINT TEST METHOD | FIXED CELL – MOVING GROUND TEST METHOD | | | TEST RESULTS | |
|----------------------------------|---------------------------------|--------------------------------------|---|---|--|---|-----------------------------|
| STRUCTURE "A" ¹ | STRUCTURE "B" ² | | STRUCTURE "A" FIXED REMOTE VOLTAGE ⁴ | STRUCTURE "B" FIXED REMOTE VOLTAGE ⁵ | STRUCTURE "A" / STRUCTURE "B" VOLTAGE DIFFERENCE ⁶ | ISOLATED / CONTINUOUS / INCONCLUSIVE ⁷ | PASS / FAIL ⁸ |
| (example) PREMIUM TANK BOTTOM | (example) PREMIUM FILL RISER | | (example) -921 mV | (example) -915 mV | (example) 6 mV | (example) CONTINUOUS | FAIL |
| (example) PREMIUM TANK BOTTOM | (example) PREMIUM FILL RISER | (example) 17 mV | | | | (example) ISOLATED | PASS |
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COMMENTS:

- 1 Describe the cathodically protected structure that you are attempting to demonstrate is isolated from unprotected structures (e.g. prem. tank).
- 2 Describe the unprotected structure that you are attempting to demonstrate is isolated from the protected structure (e.g. premium tank fill riser).
- 3 Record the voltage difference observed between structure "A" and structure "B" when conducting "point-to-point" testing (e.g. 17 mV).
- 4 Record the fixed remote structure-to-soil potential of the protected structure {"A"} in millivolts (e.g. -921 mV).
- 5 Record the fixed remote structure-to-soil potential of the isolated structure {"B"} in millivolts (e.g. -915 mV).
- 6 Record the voltage difference observed between structure "A" and structure "B" when conducting "fixed cell – moving ground" testing (e.g. 6mV).
- 7 Document whether the test (fixed cell and/or point to point) indicated the protected structure was isolated, continuous or inconclusive.
- 8 Indicate whether results of Pass or Fail the continuity survey.

XIV. GALVANIC (SACRIFICIAL ANODE) CATHODIC PROTECTION SYSTEM SURVEY

- This section may be utilized to conduct a survey of a galvanic cathodic protection system by obtaining structure-to-soil potential measurements.
- The reference electrode must be placed in the soil directly over the tested structure (local) **and** 25-100 feet away from the structure (remote).
- The local and remote voltage (s) must be -850 mV or more negative; **OR** meet the 100 mV polarization criterion in order to pass.
- Inconclusive is indicated when both the local and the remote structure-to-soil potentials do not result in the same outcome (both pass or both fail).

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

| Establishment of Remote Earth | Test Location | Remote Voltage | Remote used for CP Survey |
|--|---------------------------|----------------|--|
| DESCRIBE LOCATION OF REMOTE REFERENCE ELECTRODE PLACEMENT #1 (R1): | (Ex. Regular Tank Bottom) | (Ex. -850 mV) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| DESCRIBE LOCATION OF REMOTE REFERENCE ELECTRODE PLACEMENT #2 (R2): | (Ex. Regular Tank Bottom) | (Ex. -855 mV) | <input type="checkbox"/> Yes <input type="checkbox"/> No |

* Remote Earth must be established to ensure an accurate remote reading. See MDEQ CP policy for more information.

Difference = (Ex. 5 mV) Note: All measurements recorded in mV unless noted.

| STRUCTURE OR CONTACT POINT ² | LOCAL REFERENCE CELL PLACEMENT ³ | LOCAL / ON VOLTAGE ⁴ | REMOTE VOLTAGE ⁴ | 100 mV POLARIZATION | | | | PASS/ FAIL/ INCONCLUSIVE ⁶ |
|---|---|---------------------------------|-----------------------------|----------------------------------|-----------------------------|----------------------------|---------------------------|---------------------------------------|
| | | | | INSTANT OFF VOLTAGE ⁵ | ENDING VOLTAGE ⁵ | VOLTAGE SHIFT ⁵ | ELAPSED TIME ⁵ | |
| (example) PLUS TANK BOTTOM | (example) PLUS TANK STP MANWAY | (example) -928 | (example) -810 | | | | | (example) INCONCLUSIVE |
| (example) DIESEL STP PIPE TERM | (example) WATER STP SUMP | (example) -879 | | (example) -725 | (example) -428 | (example) 297 | (example) 10 min | (example) PASS |
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COMMENTS:

1 Designate on the site drawing each structure tested and each local and remote reference electrode placement.
 2 Describe the structure or contact point that is being tested (e.g. plus tank @ test lead; premium piping; diesel submersible pump flex connector; etc.).
 3 Describe the exact location where reference electrode is placed for each "local" measurement (e.g. soil @ plus tank STP; soil @ dispenser 5/6; etc.).
 4 Record the structure-to-soil potential measured with the reference electrode placed "locally" and "remotely" in millivolts (e.g. -865 mV, -920 mV, etc.).
 5 To meet 100 mV polarization criterion (local readings), record instant off voltage, ending voltage, voltage shift (instant off – ending voltage), and elapsed time.
 6 Indicate whether the tested structure passed or failed the -850 mV "on" criterion or 100 mV polarization criterion based on your interpretation of the test data.